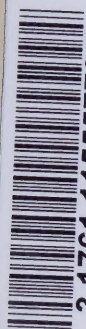


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Canada. Dept. of Indian Affairs and
Northern Development.
Prospectus North of 60

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An Introduction to Canada North of 60

The successful economic and social development of Canada north of the 60th. parallel stands as one of the foremost challenges facing Canadians today. This vast frontier region is in a process of dynamic change.

Man and machine have moved into the harsh northern environment. Modern technology has been put to work to tap the natural resources and to provide those conditions necessary to effectively develop these resources.

This thrust of economic activity is having tremendous social consequences. The native Indian, Metis and Eskimo people are caught between a desire to maintain their old traditions and values and to participate in the economic development that is engulfing them.

The administration of the Yukon and the Northwest Territories has become highly complex and demanding of government. While the Territorial Governments continue to take on additional responsibilities, the Government of Canada remains custodian of the resources North of 60.

National Objectives

The Government of Canada, in reviewing the Federal role in the north, in 1972 set out its objectives, priorities and strategies for the 1970s. The national objectives are:

1. To provide for a higher standard of living, quality of life and equality of opportunity for northern residents by methods which are compatible with their own preferences and aspirations.
2. To maintain and enhance the northern environment with due consideration to economic and social development.
3. To encourage viable economic development within regions of the Northern Territories so as to realize their potential contribution to the national economy and the material well-being of Canadians.
4. To realize the potential contribution of the Northern Territories to the social and cultural development of Canada.
5. To further the evolution of government in the Northern Territories.
6. To maintain Canadian sovereignty and security in the north.
7. To develop fully the leisure and recreational opportunities in Northern Territories.

The strategy for northern development in the 1970s involves a deliberately phased blending of social and economic programs which shifts emphasis and financial allocations to meet circumstances such as: Imbalance perceived in the approach to development at any time; Disturbance caused by some external influence (for example a major oil discovery elsewhere might affect the economics of northern oil);

Adjustment to a major innovation or event (pipeline or rail construction for example);

Conditions in Canada's economy (balance of payments problems for example);

Need to create employment and economic opportunities for the native peoples in particular.

The weight of policy emphasis varies with the intensity of government efforts in pursuit of the national objectives.

Northern Priorities

Within the overall northern strategy the following order of priorities have been established for the next decade:

1. To give rapid effect to the agreed guidelines for social improvement.
2. To maintain and enhance, through such means as intensifying ecological research, establishing national parks, ensuring wildlife conservation.
3. To encourage and stimulate the development of renewable resources, light industries and tourism, particularly those which create job and economic opportunities for native northerners.
4. To encourage and assist strategic projects (key to increased economic activity in the region or Territory with solid economic and social benefits) in the development of non-renewable resources and in which joint participation by government and private interests is generally desirable.
5. To provide necessary support for other non-renewable resource projects and of recognized benefit to northern residents and Canadians generally.

Balanced Growth

The northern development strategy is aimed at maintaining the delicately balanced ecological system in the face of heavy pressures from outside and within Canada for getting the resources out rapidly. The Government must rely on all departments and agencies to provide timely data on which it can make effective policy decisions on protecting the environment.

Government support for major development projects, whether public or private, should be based on full assessment of their economic and social impact; in the northern region concerned, in the Territories generally, and for Canada as a whole.

For purpose of economic planning and development, the Territories could, after thorough research and consultation with all concerned, be divided into regions essentially determined by differences in conditions prevailing and by the governmental approach needed to deal with them.

Because of the immaturity of the economy in most of the regions and the disruptive effects (sharp inflation, shortages of labour, accommodation and consumption goods) of major development programs, the absorptive capacity of the regional economy concerned must be carefully assessed to determine what needs to be done to prepare the region and its people for public or private projects contemplated.

Where a venture is strategic to development in a region, or over a wider area, the Government of Canada would participate in joint ventures, in

management or in ownership to ensure that matters affecting public interest, people, environment, needs are taken fully into account. This applies primarily to non-renewable resource projects.

Population centres should be fostered in accordance with a rational plan for developing the Territories systematically and for providing employment and other opportunities. Growth-point policy would provide some fairly strong incentives to migration from less favoured regions.

To deal with problems of domestic control of the economy, the Government should ensure that policies or guidelines followed in other parts of Canada are adapted to the economic situation North of 60.

The economic development in the two Territories should be adjusted as between the two of them; and to related developments in the rest of Canada, particularly in the contiguous provinces and in other northern countries, with a view to achieving complementary results.

Social Improvement Guidelines

Guidelines for social improvement should be applied in a coherent way to get the desired balance in northern developments during the 1970s.

The priority need North of 60 during the coming decade is to stimulate and strengthen the people programs, so that the native peoples in particular can have some hope of adjusting to the pace of economic and social change, and preparing themselves for participating meaningfully in northern development. The Government of Canada has set out the following guidelines for social improvement to be acted on by all departments and agencies involved in the North:

1. Consciously create in government and industry employment opportunities for native peoples through attractive incentives, meaningful targets and where necessary imposed obligations.
2. Re-orient employment practices of government and industry in order to provide intensive training, not only in preparation for foreseeable employment but including on-the-job training.
3. Liberalize education and training techniques to produce more quickly qualified native practitioners in all professions and skills including teachers, nurses, mechanical engineers, communications technicians, management personnel, aircraft pilots and mechanics among others, with full provision for continuity and upgrading.
4. Train and provide experience for native northerners in executive and administrative posts, especially at municipal levels and even at the risk of higher costs and some mistakes.
5. Improve opportunities and mechanisms for consultations involving native peoples, industry and government, for social and economic development of the native bands and communities; for hearing grievances.
6. Maintain opportunities for traditional pursuits (hunting, fishing, trapping), encouraging a shift to analogous activities (campsite supervisors, tourist guides, game and fire wardens) for native peoples,

and expanding well-established programs providing cultural outlets for the indigenous peoples so that they will be involved increasingly in all phases (including marketing).

7. Ensure sensitive counselling of native peoples and would be immigrants, closest liaison with industry and effective cooperation as a group on the part of all government departments and agencies concerned with people programs.

8. Strengthen communication links (telephone, data, radio, live television for education and entertainment) among communities in the north and between the people of the North and fellow Canadians in the South.

9. Improve transportation facilities for movement of people within the regions of the North and to and from the North.

10. Safeguard the culture (language, arts, handicrafts, traditional pursuits) of native peoples in the course of education, training, employment and community life; above all their right to choose what is to be preserved.

Northern Co-ordination

The degree of involvement in economic and social development will increasingly require a maximum achievement in policy planning, coordination and control on the part of Federal and Territorial authorities, who must work in close partnership. Parallel cooperation is needed between the public and private sectors engaged in northern development.

The means of doing so and of attaining the Government's long range objectives are to be found in the programs of some thirty Federal departments and agencies, and of the two Territorial governments.

The Minister of Indian Affairs and Northern Development, in consultation with the Advisory Committee on Northern Development, is responsible for continued and improved arrangements for joint planning and coordination of all policies and programs North of 60.

The policies and programs designed to assist the private investor in the Yukon and the Northwest Territories are the particular responsibility of the Northern Natural Resources and Environment Branch and the Northern Policy and Program Planning Branch of the Department of Indian Affairs and Northern Development.

As part of its overall program this Prospectus has been prepared to assist the private investor to obtain the latest information on resource and economic development North of 60. The Prospectus is being maintained as a current working document by the Northern Policy and Program Planning Branch. It is the hope of the Branch that the Prospectus will be a useful document for the business and investment communities of Canada and abroad.

Additional information may be sought from the office of the:

Director,
Northern Policy and Program Planning Branch,
Department of Indian Affairs and
Northern Development,
400 Laurier Avenue W.,
Ottawa, Ontario
K1A 0H4

On January 19, 1948 the Cabinet approved the establishment of the Advisory Committee on Northern Development with membership from senior levels of departments and agencies. This body's responsibility is to advise the government on questions of policy relating to civilian and military undertakings in Northern Canada and to provide for the effective co-ordination of all government activities in that area.

On January 22, 1953 the Cabinet directed that the Advisory Committee on Northern Development report immediately and periodically thereafter on all phases of development in the Canadian North. The Committee agreed that a report entitled "Government Activities in the North" should be published annually. This report reviews the operations of the past year and outlines plans for the coming year of all the federal government departments, agencies and Crown corporations active in the Territories. It is published in both English and French and can be obtained by writing to:

Information Services,
Department of Indian Affairs and
Northern Development,
400 Laurier Avenue West,
Ottawa, Ontario K1A 0H4

At present there are eight sub-committees with supporting working groups functioning within the ACND structure. (See Table 1)

Advisory Committee on Northern Development

Committee Structure

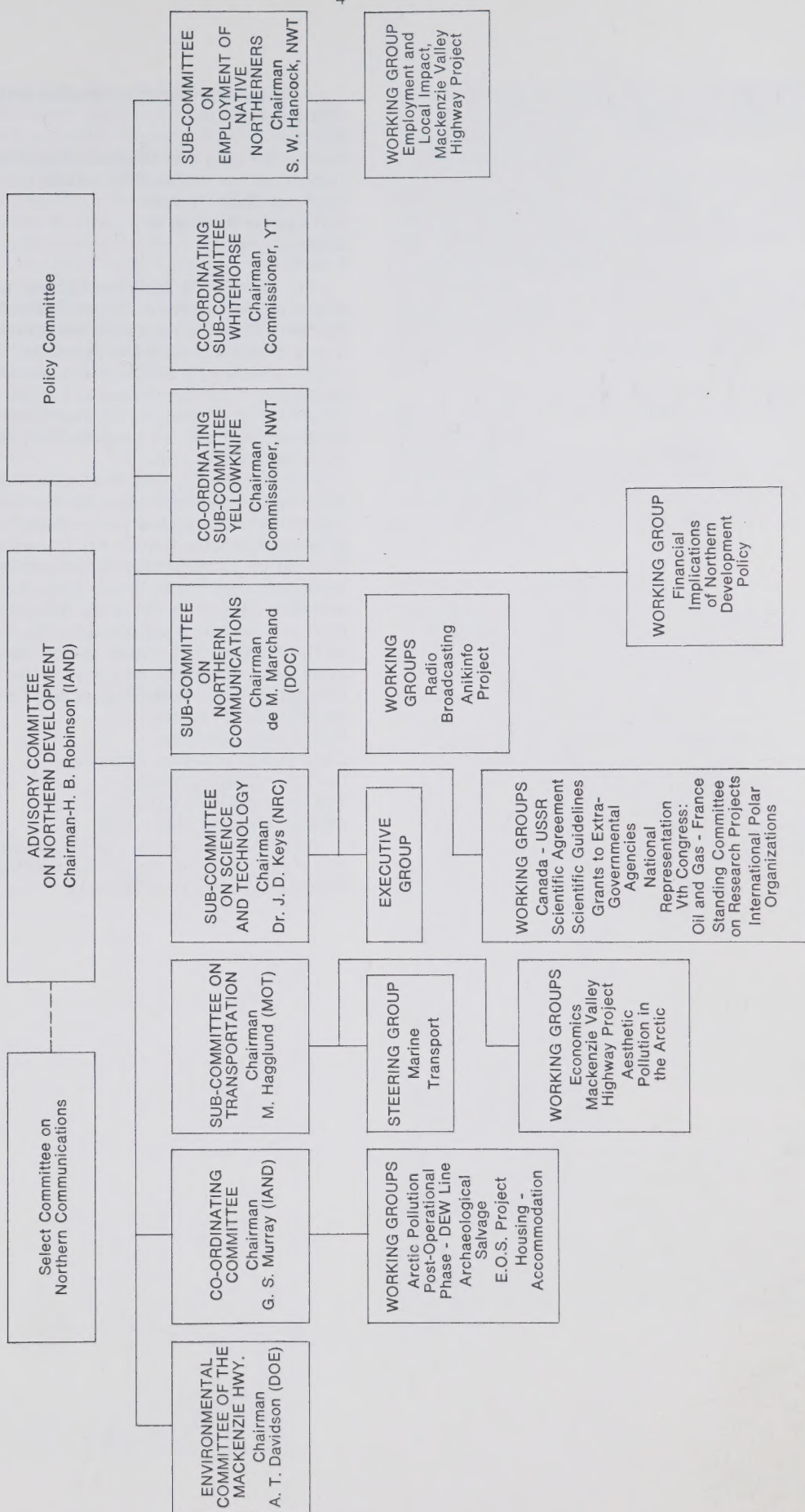



Table 1

North of 60

Incentive Programs





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Revised January, 1974

Incentive Programs North of 60

1-1.1 General

The Federal Government has made available a series of incentive programs designed to aid both companies and individuals in exploration and development activities North of 60. These programs are administered by the Policy and Program Planning Branch of the Department of Indian Affairs and Northern Development.

The Branch has been given the responsibility for the effective management of the oil and gas, mineral, water, forest and land resources, and for the economic development of the Yukon and the Northwest Territories generally.

Oil and gas and mining today provide the basic foundation for economic growth in the Territories. However, the government also endeavors to create opportunities in other fields such as tourism, fish and game hunting and related industries, through such programs as the Small Business Loan Funds.

Through this policy, the individual resident North of 60 is able to take part in the economic activity North of 60.

The Federal Government has adopted a flexible attitude in its incentive programs. Where there is no existing program available to meet a particular situation, the government will provide assistance to projects which show potential.

An example of this was in the government's decision to assist in the opening of the Pine Point lead-zinc mines near Great Slave Lake by constructing a 420-mile railway line, at a cost of \$86,000,000. In addition, the Government built a 35,000 horsepower hydro-electric plant on the Taltson River, 150 miles from Pine Point, at a cost of approximately \$9,000,000.

In 1972 the Government decided to proceed with construction of an all-weather highway down the Mackenzie River valley to facilitate pipeline construction, anticipated by the discovery of oil and gas in the Canadian north and neighboring Alaska.

The Government's participation in Panarctic Oils Limited is another example of a Federal incentive. The Government joined with a number of private companies as an equity partner in a program of exploration for oil and gas in the Arctic Islands. As holder of a 45-per-cent equity in the company, the Government, as at January, 1973 had contributed \$45,000,000 out of a total partnership financing of \$101,000,000.

A further example is the program of developing all-weather air-strips throughout the North. Eleven such strips are included in the initial remote airport program and ten are to be completed by 1976 with one deferred because of lack of development activity in the community.

1-2.1 Northern Roads Program

The Northern Roads Program was introduced by the Federal Government in 1965 and revised in 1971. It provides for an expenditure of \$10,000,000 each

year for ten years to establish a systematic road network designed for longterm use in the Yukon and the Northwest Territories.

In 1972 the Government, anticipating the construction of a pipeline or pipelines carrying oil and gas from northern fields to southern markets, decided to proceed with the construction of a highway the full length of the Mackenzie Valley from the Alberta border to the Arctic Ocean. When completed the road will be more than 1,050 miles long and, in the opinion of the government, will have a profound effect on the improvement of the living standards and economic opportunities for northern peoples who live along the Mackenzie River.

The road is designed to facilitate the pipeline construction along the Mackenzie Valley. It is the intention of the government to recover part of the cost of the highway from the pipeline projects. At time of writing the government had yet to determine the method of cost recovery.

The government had already built 296 miles of the road, which reached Fort Simpson at the end of 1970. Construction began in 1972 on a section of the road northward from Fort Simpson. Work begun in 1970 on a stretch of the Mackenzie Highway between Inuvik and Arctic Red River is being accelerated.

The government planned to spend \$9.16 million in 1972 towards the construction of the Mackenzie Highway.

In addition, \$5.98 million was planned to be spent in 1972 on the extension of the Dempster Highway running from Dawson, Yukon Territory to Arctic Red River, Northwest Territories a distance of approximately 365 miles.

For purposes of classification and costing, the Northern Roads Program is divided into Resource Roads and Communications Roads.

Resource roads include the following:

- Area Development Roads
- Pioneer Resource Roads
- Permanent Access Roads
- Initial Access Roads
- Tote Trails

Communications roads include the following:

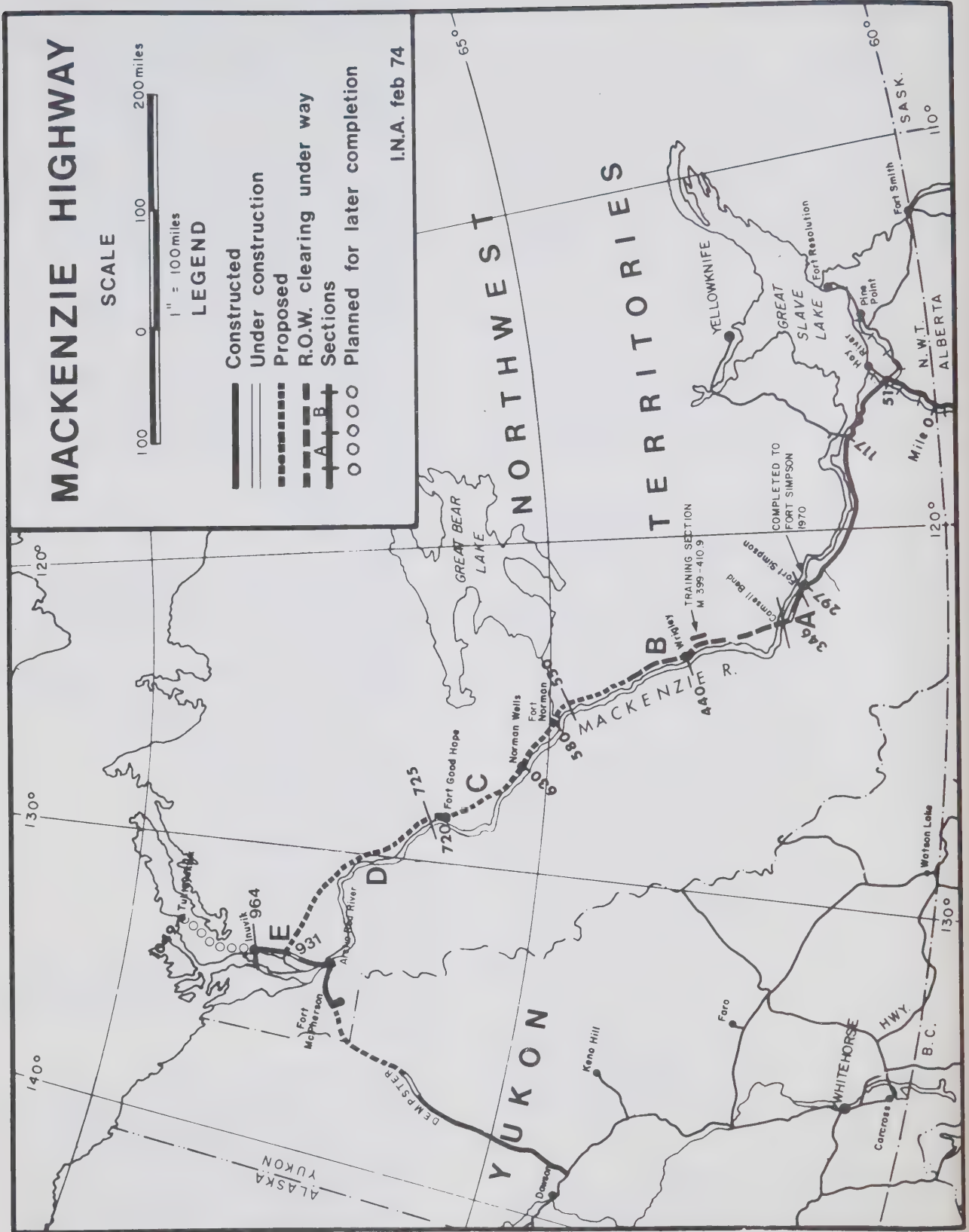
- Trunk Highways
- Secondary Roads
- Pioneer Roads
- Airport Roads
- Local Roads

Major bridges are also included in the Northern Roads Program but are to be funded outside the approved \$10 million annual program for new road construction.

1-2.1.1 Area Development Roads

Area development roads are roads of medium construction standard into or through an undeveloped region of favourable natural resource potential. Their purpose is to foster new growth in the economic activities of the area traversed.

The Minister may recommend that an area development road be built if he has received a favourable report from the Interdepartmental Roads



Appraisal Committee and if he is satisfied that the road will provide access to an area which has a favourable natural resource potential.

The minimum desirable road standards are:

Desirable design speed	— 50 mph (not related to minimum standards)
Width of right of way	— 200 feet
Travelled surface	— 18 feet
Width of shoulders (each)	— 3 feet
Bridge design	— H20-S16
Bridge width and height	— 24 feet and 14 feet 6 inches
Maximum grade	— 10%
Maximum curvature	— 12°

The Federal Government is responsible for construction and all construction costs. Initially maintenance costs will be paid by the Federal Government, however, following the next renewal of the Federal-Territorial Financial Relations agreement costs will be borne as follows — 85% by the Federal Government, and 15% by the Territorial Government.

1-2.1.2 Pioneer Resource Roads

Pioneer Resource Roads are low standard roads designed to provide access into undeveloped areas of favourable natural resource potential. In this respect they serve the same purpose as Area Development Roads the difference being that they are intended for situations where the construction of the higher standard Area Development Roads is not justified. Winter roads are included in this category.

The Minister may recommend that a Pioneer Resource Road be built if he is satisfied that the road will provide access to an area which has a favourable natural resource potential.

A Pioneer Resource Road should be built to the minimum standard that in the opinion of the Minister is compatible with the purpose intended.

The Federal Government is responsible for construction and construction costs. Maintenance costs will be paid initially by the Federal Government and, following the next renewal of the Federal-Territorial Financial Relations Agreement costs will be borne as follows — 85% by the Federal Government, and 15% by the Territorial Government.

1-2.1.3 Permanent Access Roads

Permanent Access Roads are roads which lead from the nearest permanent road to the location of a resource development which has reached the "Pre-Production — Production Stage".

Financial assistance for the construction of a Permanent Access Road is subject to the approval of the government on the recommendation of the Minister.

The minimum desirable road standards are:

Desirable design speed	— 50 mph (not related to minimum standards)
Width of right of way	— 200 feet
Travelled surface	— 18 feet
Width of shoulders (each)	— 3 feet
Bridge design	— H20-S16

Bridge width and height	— 24 feet and 14 feet 6 inches
Maximum gradient	— 10%
Maximum curvature	— 12°

Construction is the responsibility of the company undertaking the resource exploitation project.

All maintenance costs are the responsibility of the company concerned. Should the Permanent Access Road be reclassified, the company is not entitled to reimbursement for any maintenance costs incurred prior to reclassification.

The Minister may authorize a contribution of up to ⅓ of the cost of construction but not exceeding 15% of the actual capital invested by the company prior to the start of commercial production or exploitation, or \$40,000 per mile, whichever is the lesser.

Further information or applications for financial assistance are available from Northern Policy and Programs Planning Branch, Department of Indian Affairs and Northern Development.

1-2.1.4 Initial Access Roads

An Initial Access Road is a low standard road designed to provide temporary, seasonal or year-round access to the property of a company engaged in exploring or developing a natural resource. If as a result of road length, terrain, or difficulty of construction, total costs are such that the \$20,000 maximum available under the Tote Trail category would be insufficient, a road can be categorized as an Initial Access Road.

Financial assistance for the construction of an Initial Access Road is subject to the approval of the Minister.

An Initial Access Road should be built to the minimum standard that, in the opinion of the Minister, is compatible with the purpose intended.

Construction is the responsibility of the company or individual(s) undertaking the resource exploration or development project. All maintenance costs are the responsibility of the company or individual(s) concerned. Should the Initial Access Road be reclassified, the company or individual(s) are not entitled to reimbursement for any maintenance costs incurred prior to reclassification.

The amount of Federal assistance will not exceed 50% of the actual road cost, or 5% of the company's expenditure on exploration or development of the project, or \$10,000 per mile, whichever is the lesser.

The maximum yearly contribution is limited to \$100,000 if the project is exploratory in nature and to \$500,000 if the project is primarily development oriented.

1-2.1.5 Tote Trails

Tote Trails are low standard roads designed to provide temporary, seasonal or even year-round access to a resource project in the exploration or development stage. Winter roads are included in this category.

Financial assistance is subject to the approval of the Territorial Commissioner who administers the program.

A Tote Trail shall be built to the minimum standard that in the opinion of the Commissioner is compatible with the purpose intended.

Construction and maintenance are the responsibility of the company or individual(s) concerned. Should the Tote Trail be reclassified the company or individual(s) are not entitled to reimbursement for any maintenance costs incurred prior to reclassification.

Assistance in the construction of the Tote Trails may be up to 50% of the actual cost or \$20,000, whichever is the lesser.

Further information and applications for Tote Trails are available from the Commissioner of the Northwest Territories or the Commissioner of the Yukon.

1-2.1.6 Trunk Highways

Trunk Highways are roads of high construction standards which provide connecting links between the Territories and the southern part of Canada or between the principal centres of population within the Territories and which, from their inception, can be expected to carry a significant density of traffic.

Trunk Highways are built to the minimum standards or to a higher standard when, in the opinion of the Minister, the anticipated density of traffic and other related factors justify a higher standard.

The minimum road standards are:

Desirable design speed	— 60 mph (trucks 55 mph)
Width of right of way	— 200 feet
Width of road (including shoulders)	— 32 feet
Bridge design	— H20-S16
Bridge width and height	— 24 and 14 feet 6 inches
Maximum gradient	— 5%
Maximum curvature	— 7°

The Federal Government is responsible for construction. Maintenance costs are paid initially by the Federal Government, and following the next renewal of the Federal-Territorial Financial Relations Agreement, 85 per cent by the Federal Government and 15 per cent by the Territorial Government. Maintenance of the Alaska Highway, however, continues to be solely a Federally funded responsibility, with the Yukon Territorial Government acting as the maintenance agency on the section in the Yukon Territory.

All costs of construction are paid by the Federal Government.

1-2.1.7 Secondary Roads

Secondary roads are designed to carry a lower density of traffic and are built to lower construction standards than trunk highways. They may have one or other of two purposes:

- to provide connecting links of secondary importance between the Territories and the southern part of Canada, or between centres of population; or
- to extend the basic northern roads network into undeveloped areas where it is reasonable to expect a requirement for resource roads.

The minimum road standards are:

Desirable design speed	— 50 mph
Width of right of way	— 200 feet

Width of road (including shoulders)	— 24 feet
Bridge design	— H20-S16
Bridge width and height	— 24 feet and 14 feet 6 inches
Maximum grade	— 10%
Maximum curvature	— 12°

The Federal Government is responsible for construction. Maintenance costs are paid initially by the Federal Government, and following the next renewal of the Federal-Territorial Financial Relations Agreement costs will be borne as follows — 85% by the Federal Government and 15% by the Territorial Government. All construction costs are paid by the Federal Government.

1-2.1.8 Pioneer Roads

Pioneer Roads are low standard roads designed to provide access to outlying population centres in a reasonably short period of time where, normally, the construction of higher standard network roads would not be planned for a number of years in the future. Included in this category are winter roads.

A Pioneer Road should be built to the minimum standard that, in the opinion of the Minister, is compatible with the purpose intended. The Federal Government is responsible for construction. Maintenance costs are paid initially by the Federal Government and, following the next renewal of the Federal-Territorial Financial Relations Agreement costs will be borne as follows — 85% by the Federal Government and 15% by the Territorial Government. The Federal Government pays all construction costs.

1-2.1.9 Airport Roads

Airport Roads are roads which connect the property boundary of approved public airports on land or water with the nearest Resource or Communication Road.

Minimum desirable standards are:

Desirable design speed	— 30 mph
Width of right of way	— 200 feet
Width of road (including shoulders)	— 24 feet (absolute minimum)
Bridge design	— H20-S16
Bridge width and height	— 24 and 14 feet 6 inches
Maximum grade	— 12%
Maximum curvature	— 14°

Construction is the responsibility of the Federal Government. Maintenance costs are paid initially by the Federal Government and, following the next renewal of the Federal-Territorial Financial Relations Agreement costs will be borne as follows — 85% by the Federal Government; and 15% by the Territorial Government. All construction costs are paid by the Federal Government.

1-2.1.10 Local Roads

Local Roads are public roads lying within a community that are constructed and entirely maintained on a seasonal or year-round basis by the local and/or Territorial Government. These roads are built to the minimum standard that, in the opinion

of the Commissioner, is compatible with the purpose intended. The Territorial Government is responsible for construction and maintenance costs.

1-2.1.11 Major Bridges

Major Bridges are bridges which are designated as such by the Minister. In general, they will be expected to cost in excess of \$1 million to construct. In most cases Major Bridges will replace ferry and ice bridge systems.

These bridges are built to a standard which is compatible with the standard of the road or highway, of which the bridge forms a part. The Federal Government is responsible for construction. Maintenance costs will be paid initially by the Federal Government and, following the next renewal of the Federal-Territorial Financial Relations Agreement costs will be borne as follows — 85% by the Federal Government and 15% by the Territorial Government.

All construction costs are paid by the Federal Government.

1-3.1 Northern Mineral Exploration Assistance Program

The Northern Mineral Exploration Assistance Program is designed to encourage the investment of domestic risk capital in both mineral and oil and gas exploration North of 60.

At the same time it seeks to reach those sources of capital which up to now have been unable to take advantage of the write-offs allowed under the Income Tax Act to those engaged in the exploration and development of minerals and petroleum.

In effect, recipients of the assistance grant may receive comparable benefits to those obtainable by companies which can now do so under paragraphs (a) and (b) of subsection (1) of Section 66 of that Act.

Applications

Applications for Northern Mineral Exploration Assistance Grants, when completed to the satisfaction of the Minister, are dealt with in the order in which they are received whether or not the grant, if approved, is made in the same fiscal year as the application. A grant may not exceed 40% of the cost of an approved exploration program. Provision has been made for the Department to make payments, over an unspecified number of years, up to an aggregate ceiling of \$9,000,000.

Applicants for grants must, if individuals, be over 21 years of age, Canadian citizens and own beneficially the holdings upon which it is proposed to carry out an exploration program or otherwise be entitled to do exploration work on these holdings by virtue of a lease or option agreement. The term holding is used for convenience as it can encompass a mineral claim, a lease, or permit to explore. Private companies applying for a grant must be at least 50% beneficially owned by Canadian citizens and incorporated in Canada or in a Province of Canada.

Public companies must be incorporated in Canada, or in a Province of Canada. They must also have their common shares listed on a Canadian stock exchange or have them offered for sale to the public

in Canada through a registered securities dealer.

Provision is also made in the Regulations for the making of grants to companies incorporated in Canada, or in a Province of Canada, formed for the purpose of and engaged in exploring for minerals in Northern Canada where the company is the beneficial owner of the holdings over which the exploratory program is to be carried out, or it has a lease or option agreement to work on these holdings, and not more than 15% of its issued common shares are beneficially owned in the aggregate by one or more companies of the type described in paragraph (a) or (b) of subsection (1) of section 66 of the Income Tax Act.

Assessment

An applicant for a grant must submit all the information required to assess his eligibility for assistance, and must, in the event that an exploratory program which will not be completed in the same fiscal year, break down his program into stages with estimates of costs to be incurred during each stage. This will facilitate the estimating of the amount of funds required in future years.

Public Information

As public funds are involved, provision is made for information obtained on holdings as a result of an exploration program to be made public two years after the completion of the program.

Assignment

No assignment or transfer of holdings or of an interest in them may be made without Ministerial approval once an exploratory program has been approved for a grant.

Payment

After a grant has been approved, no payment or part payment of the grant will be made until the completion of the entire exploration program or a pre-approved stage thereof. There is, however, a provision that where it has become evident, as a result of preliminary exploration that further work would result in dissipation of funds, a proportional payment may be made based on the expenditures incurred up to the time of cessation of the program.

Statements

Recipients of grants are required to submit a sworn statement of their program expenditures within ninety days of the completion of an exploratory program or of a pre-approved stage thereof. All statements of expenditure must be verified by statutory declaration and be accompanied by a full report containing details of all information gained as a result of the expenditures made.

Repayments

A grant is not subject to repayment if the recipient

is notified by the Minister that, in his opinion, no indication has been found of the presence of oil, gas, or other minerals in quantities likely in the future to permit production for gain as a result of the exploratory program.

Grants become repayable on the first anniversary of the date on which production for gain begins, the date of which is normally established as being three calendar months following the official date of the mine opening announced by the recipient. The rate of annual repayment will not be less than 10% of the outstanding grant, together with interest. The rate of interest as a percentage rate will be equal to 2 plus the average of the interest rates stated on the face of long term Government of Canada Bonds outstanding during the calendar year preceding the year in which the payment is due. In the case of a recipient being a public company whose common shares are quoted on a Canadian stock exchange, if the Minister and the recipient of the grant agree, the issue to Her Majesty in right of Canada of common shares having an aggregate market value equal to the amount owing on the date of the agreement will be accepted. A repayment may also be made partly in cash and, by agreement, partly by issuing common shares. In the event that full repayment in part common shares and part cash is not made in one transaction not less than 10% may be paid as a first instalment of the outstanding part of the grant with a similar amount and interest on each subsequent instalment. A recipient may repay a grant in full at any time without notice or bonus.

Provision is made, where in the opinion of the Minister, economic circumstances justify a change in the rate of repayment of a grant, to increase the amount of the instalments to the paid and power is also given to decrease the amount of the instalments and reduce the rate of interest payable. The former would likely occur where the mine operated at a considerably higher profit level than initially anticipated while the latter would apply in the converse situation. Further, because of new discoveries richer, and nearer centres of consumption, an operation might cease to be profitable in which event the Minister may forgive the unpaid balance of the grant in whole or in part together with interest thereon.

Representation

No person may represent that the approval of or making of a grant connotes Government sponsorship of his company. This provision is to avoid unintentionally misleading the public or company subscribers into believing that Government assistance presupposes the presence of economic mineral deposition on any of the holdings described in the applicant's application.

Breaches

Should a recipient be in breach of the regulations, he will be required to repay the amount of grant paid to him in full with interest at a rate of 10% per annum from the date or dates of the advance of the money. Further, he will be prohibited from obtaining a grant in the future.

General

Applicants are considered on a first-come basis. Copies of the Northern Mineral Exploration Assistance Regulations and application forms are available from the Northern Policy and Program Planning Branch, Department of Indian Affairs and Northern Development.

1-4.1 Prospectors' Assistance Program

Prospectors may be provided with grants of up to \$900 per year under this program to assist in outfitting and transportation costs to their area of activity. A total of \$70,000 is available in 1973 for both Territories. Two thirds of the grant to each prospector may be provided in advance. The program is designed to assist individual prospecting activities but two or more prospectors may pool their resources to reduce charter flying costs and similar common expenses. In this case however each prospector is eligible for the maximum grant.

The program is administered by a screening board and every application must be approved by this board. Applications are considered on a first-come basis. A prospector must spend a minimum of 60 days in the field and is required to submit a diary and report to receive final payment.

Applications for assistance may be obtained from any Mining Recorder's office in the Territories or from the Northern Policy and Program Planning Branch, Department of Indian Affairs and Northern Development, Ottawa.

1-5.1 Northern Resource Airports Program

Resource airports are divided into two categories:

- (a) Exploratory airports — built to assist initial exploratory work or to assist in locating mineral or other natural resources.
- (b) Pre-production airports — built to assist in the pre-production or early production phases of resource exploitation. These are constructed to a higher standard than exploratory airports.

Cost sharing agreements for the establishment of the above types of airport may be made between the Federal Government and a natural resource development company, a private tourist or recreational enterprise or an established air carrier.

Both categories of airport are to be built to the standards considered adequate by the Federal Government's Ministry of Transport. The private company has the responsibility for construction, maintenance and operation of all airports constructed under this program. Such airports are to be available for public use at all reasonable times and are held by or are arranged to be transferred to the Federal Government. In certain cases landing fees may be charged by the company operating the airport to help defray airport maintenance. Approval for charging such fees must first be obtained by the company from the Department of Indian Affairs and Northern Development.

It is the policy of the Department to negotiate only with a single company or agency for the construction of a resource airport. If more than one company or agency is involved, it is suggested they

form a single agency or syndicate to negotiate with the Government.

1-5.1.1 Exploratory Airports

Exploratory airports are airstrips of minimum dimensions which serve specific resource sites at which one or more private companies are active. Such airstrips are constructed at the exploration phase of resource exploitation for the purpose of bringing in personnel, supplies and equipment. In other cases, their primary usage may be to provide access to a locality on behalf of one or more tourists entrepreneurs initiating recreational developments. Departmental participation in the construction of airstrips of this type is to be contingent upon the receipt of reasonable evidence that the area in question has a resource potential, and that the project itself is worthy of public assistance.

Such airstrips are built to the minimum standards considered adequate by the Ministry of Transport for their intended use.

The Department of Indian Affairs and Northern Development will pay fifty per cent of the cost of an individual exploratory airport up to a maximum Federal expenditure of \$20,000. Where the full cost of any such airstrip exceeds \$40,000, the private cost sharing interest will bear the full cost in excess of this amount. The annual Federal expenditure for airstrip construction assistance in the NWT and YT is expected to average out to \$160,000, depending on the pace of northern exploratory activity. It is the intention to spend roughly half of the total Federal amount in each of the Yukon and Northwest Territories during any single year.

Federal cost sharing may take place with a natural resource development company, a private tourist or recreational enterprise, or any established air carrier. The company concerned must be able to provide demonstrable evidence of its financial and general reliability and the Federal cost sharing must in all instances be directly connected with some form of natural resource development. The cost-sharing company — for the duration of its operational interest in the completed facility — shall make its exploratory aerodrome available for public use at all reasonable times.

Operation and maintenance will be the responsibility of the private interests concerned.

1-5.1.2 Pre-production/Production Airports

These airports provide access to specific resource sites at which one or more companies are active at the pre-production or early production phase of resource exploitation (or at its equivalent for example in terms of development of tourist facilities). As such airports are being constructed primarily for the benefit of the companies concerned, Department of Indian Affairs and Northern Development participation in their construction will be contingent upon its receipt of good evidence from the company or companies involved that the operation in question is expected to be of reasonably long duration and public advantage.

An economic evaluation of the company's operations and of the general circumstances must be prepared in connection with the proposed airport prior to seeking Treasury Board's approval for the release of public funds for its construction. The project would be deemed undeserving of public financial assistance if the economic evaluation is unable to substantiate that the project itself will be significantly beneficial for the territory concerned.

While pre-production or early production phase airports do not have an important general aviation role, they nevertheless will have some role in this respect. In some cases, they may be required to serve multi-engine aircraft with a degree of regularity once the resources in their vicinity are being actively utilized. Because of this, provision should be made at the outset for the possibility that these airports, at their ultimate development, may become mainline airports. Thus, one runway should be located and designed so as to have an extendable length capable of accommodating larger aircraft and the Ministry of Transport is to be consulted on their design and construction.

The Federal Government may pay fifty per cent of the cost of a pre-production or early production phase airport up to a maximum Federal expenditure of \$100,000 per airport. The interested private company (or companies) will contribute the balance and will bear fully any airport construction costs exceeding \$200,000. The necessary funds will be sought by means of the inclusion of a specific item in the appropriate vote of the Department's estimates following receipt of a request for assistance.

Operation and maintenance of pre-production or early production phase airports will be the responsibility of the private interests concerned. These airports must be available for public use at all times. If it is decided subsequently that an airport of this category should be reclassified, the new responsibility for operation and maintenance will be determined by the terms of the new classification.

1-5.1.3 Application of Policy

The following is a guide to eligible items for development which will be considered in each new airport or airport improvement which is approved.

Land Acquisition

— Resource airports in the Northwest Territories and Yukon Territory will always be built in areas where the surface rights to the land are held by or can be arranged to be transferred to the Federal Government. The Federal Government retains ownership of airports built under the provision of this policy. When a resource airport is reclassified, and operation and maintenance is taken over by a government agency, the company will have no claim to compensation for funds expended on construction operation or maintenance prior to its takeover.

Preparation of Site

— Eligibility of grading, drainage, and associated items of site preparation will be limited to the overall site preparation required for development in accor-

dance with the approved plan. Grading in approach areas is eligible only to remove terrain which constitutes an obstruction.

— Eligible drainage work off the airport site includes drainage outfalls, drainage disposal, interception ditches, etc.

Runways

— Runways may be developed initially of turf, graded, gravelled or paved surfaces in accordance with approved specifications and current Ministry of Transport standards, depending upon the operational requirement in each case and subject to site consideration.

— Types of work eligible include reconstruction and resurfacing where such resurfacing is to increase the load bearing capacity of the runway or to provide a levelling course to correct major irregularities in the surface.

Taxiways

— Taxiways may be developed initially of turf, graded gravelled or paved surfaces in accordance with approved specifications and current Ministry of Transport standards depending upon the operational requirement in each case.

Aprons

— The construction of aprons will be eligible.

Roads and Sidewalks

— The construction of airport roads which are wholly within the airport boundaries will be eligible if justified on the basis of actual need for operating and maintaining the airport.

Fencing

— Boundary or perimeter fences for security purposes will be eligible.

Miscellaneous

— In addition to above items, such other items that may be specifically approved by the Department are eligible.

Eligibility or Repair Work vs. Maintenance Work

— Unlike repair work, maintenance work is not airport development and, therefore, is ineligible for inclusion in the Department's assistance program. Consequently, it will be necessary in many cases that a determination be made whether the work proposed is maintenance or repair.

— As a guide in making a judgment by the applicant in such matters, "maintenance" should be regarded as including any regular or recurring work necessary to preserve an existing facility in good condition, any work involved in the care or cleaning and incidental or minor repair work on existing airport facilities. On the other hand, repair work or reconstruction should be regarded as including any major work necessary to restore or preserve the facilities.

General

— After receipt and approval of a request for

assistance, funds will usually be provided in the Departmental estimates for the year following but in some cases where there is a need for speedy action, the funds may be provided during the current fiscal year.

Project Requests

— A formal request in writing for assistance is necessary before any proposed project will be considered. The purpose of the request is to provide funds made available by Parliament. The request will be considered only as a preliminary notice of the applicants interest without obligating it or the Department to perform any work or expend any funds. Acknowledgement of the request does not imply that the proposed project will be approved or included in the program for any particular year.

Project Evaluation

— Each proposed airport project will be assessed to determine the amount of departmental funds that would be involved. The relative importance of any request for assistance is dependent upon the degree to which it can be shown that:

- (i) a given area has resource potential but assistance is necessary to encourage further exploration.
- (ii) the development of proven potential is economically feasible, but encouragement and assistance are necessary to bring about the actual exploitation of the resource.

Application

— Requests for assistance will be submitted to the Director, Northern Policy and Program Planning Branch, Department of Indian Affairs and Northern Development, 400 Laurier Avenue West, Ottawa K1A 0H4.

— The filing of a request is the first step and indicates the interest and ability of the applicant to undertake the development if departmental funds are made available and outlines the work proposed by the available. It also provides information on which the department can base its evaluation of the project.

— Items of development proposed for inclusion in a request for assistance will be considered in the light of Ministry of Transport standards existing at the time. Each item or project for which assistance is sought will be justified on its own merit and must contribute towards the usefulness of the airport and safety of operations.

Advance Planning

— In cases where an eligible project cannot be completed in one fiscal year, allocations may be made for more than one fiscal year provided, however that any such future allocations cannot be accepted as a departmental commitment until Parliament has approved the necessary funds.

1-6.1 Other Programs and Incentives

The Federal Government will in some instances finance economic feasibility studies of proposed northern primary production operations. The Govern-

ment also provides assistance and services such as financial support for Chambers of Mines, subsidized assay services, strategically located mining recorder's offices and the planning and development of certain townsites.

Federal Government departments and agencies work together in providing material assistance to various resource development operations. The Ministry of Transport and the Department of Public Works may provide or assist in developing physical facilities necessary for the movement of materials in pre-production operations and the subsequent shipment of material in production operations. The Northern Canada Power Commission, a Crown agency may be involved in the provision of hydro-electric or thermally generated electric power to production operations, such as at Pine Point and Yellowknife.

These forms of financial aid and general assistance are over and above the various tax concessions, benefits and write-offs available to companies under the Income Tax Act.

The type and amount of assistance depends on the actual operation envisaged — in particular, its potential contribution to the objectives of northern development.

Inquiries for additional information on incentive programs may be obtained from the Northern Policy and Program Planning Branch, Department of Indian Affairs and Northern Development, 400 Laurier Avenue W., Ottawa K1A 0H4.

1-7.1 Small Business Loan Funds

In a move to meet the special requirements of small business enterprises North of 60 the Federal Government has established Small Business Loan Funds, amounting to \$5,000,000 each for the Yukon and the Northwest Territories. Loans will be made available as soon as the administrative machinery is established. They will be administered by local credit committees in Whitehorse, YT, and Yellowknife, NWT.

Under the plan, up to \$600,000 will be lent annually in each Territory from the funds to businesses already operating or to entrepreneurs starting a new business.

The Government established the program because small business men North of 60 generally lacked access to sufficient capital or credit to finance the higher-than-average investments required for northern operations. Existing credit sources in the Territories, such as chartered banks, have been unable to meet the special needs of small businesses in the regions.

Such businesses as hotels, laundries and restaurants, municipal services and small manufacturing plants will be able to take advantage of the funds. The interest rate will be such that the scheme is self-sustaining except for administrative costs connected with the provision of management advice, which will be absorbed by the Federal Government.

Only residents of the two Territories are eligible for loans. Further information may be obtained by writing:

Director
Territorial & Social Development Branch,
Department of Indian Affairs and
Northern Development,
400 Laurier Avenue W.,
Ottawa, Ontario K1A 0H4

North of 60

Oil and Gas



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Oil and Gas North of 60

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Oil and Gas North of 60

2-1.1 General

The discovery by Imperial Oil of oil at its Atkinson H-25 well in January, 1970 brought to full realization the dream of oil explorers that the delta region of the Mackenzie River was the site of a major oil pool. Their anticipation had been triggered by the earlier discoveries of oil and gas in the Mackenzie delta and in the Arctic Islands have served to delineate the fields and to strengthen the belief that sufficient reserves of oil and gas in the region, coupled with those already known to exist in neighbouring Alaska that it may be feasible to bring these fields into production and to transport oil and gas to southern markets.

The result has been a concentration of research projects by both government and industry to determine if, indeed, it is possible to overcome the tremendous problems inherent in transporting oil and gas from the Canadian north with the obvious economic, environmental and social problems that go with it. The vast quantity of data is now being processed and studied in preparation for the final determination on the future of an oil and gas industry in the Far North.

About 450,000 square miles of the region are underlain by sedimentary rocks, ranging in age from Cambrian to Tertiary that may be considered to be potentially productive of oil and gas.

All aspects of oil and gas operations in the Yukon and the Northwest Territories are administered by the Department of Indian Affairs and Northern Development, and specifically by the Oil and Mineral Division of the Northern Economic Development Branch.

It is the policy of the Federal Government to encourage such exploration and development, but at the same time all steps are being taken to ensure full consideration is being given to the needs of the native peoples, and the need to protect the environment from unnecessary damage.

2-1.2 The Task Force on Northern Oil Development

In 1968 the Federal Government established a Task Force on Northern Oil Development. The Task Force, composed of senior officers of federal departments and agencies directly concerned, is co-ordinating the government's involvement in appraisal and policy studies.

The Task Force is under the chairmanship of the Deputy Minister of Energy, Mines and Resources. It includes the Deputy Minister of the Department of Indian Affairs and Northern Development, the Deputy Minister of Environment Canada, the Deputy Minister of the Ministry of Transport and the Chairman of the National Energy Board.

The task Force is bringing together all current information on the petroleum situation in the north and transportation routes that might be used to bring oil and gas from the north to southern markets. It is also co-ordinating relevant information from federal agencies and departments, and reporting with proposals and recommendations to government.

The Task Force is working with the Advisory Committee on Northern Development in examining the technical and economic feasibility to deep sea ports in the Arctic. Another study involves the federal government's position relative to transportation and marketing proposals, with particular reference to the benefits and costs to the economy at large arising from several alternatives for northern oil transportation and marketing.

The work of the Task Force embraces areas involving at least eleven federal departments and agencies.

The workload is carried by six committees — pipeline, economic impact, environmental social, transport, industrial supply and marketing.

Details of the organization and work of the Task Force on Northern Oil Development are to be found in the report "Pipeline North" produced by the Environmental-Social Committee. The report is available through:

Information Services Division,
Department of Indian Affairs
and Northern Development,
400 Laurier Avenue West,
Ottawa, Ontario.
K1A 0H4

2-1.3 Pipeline Guidelines

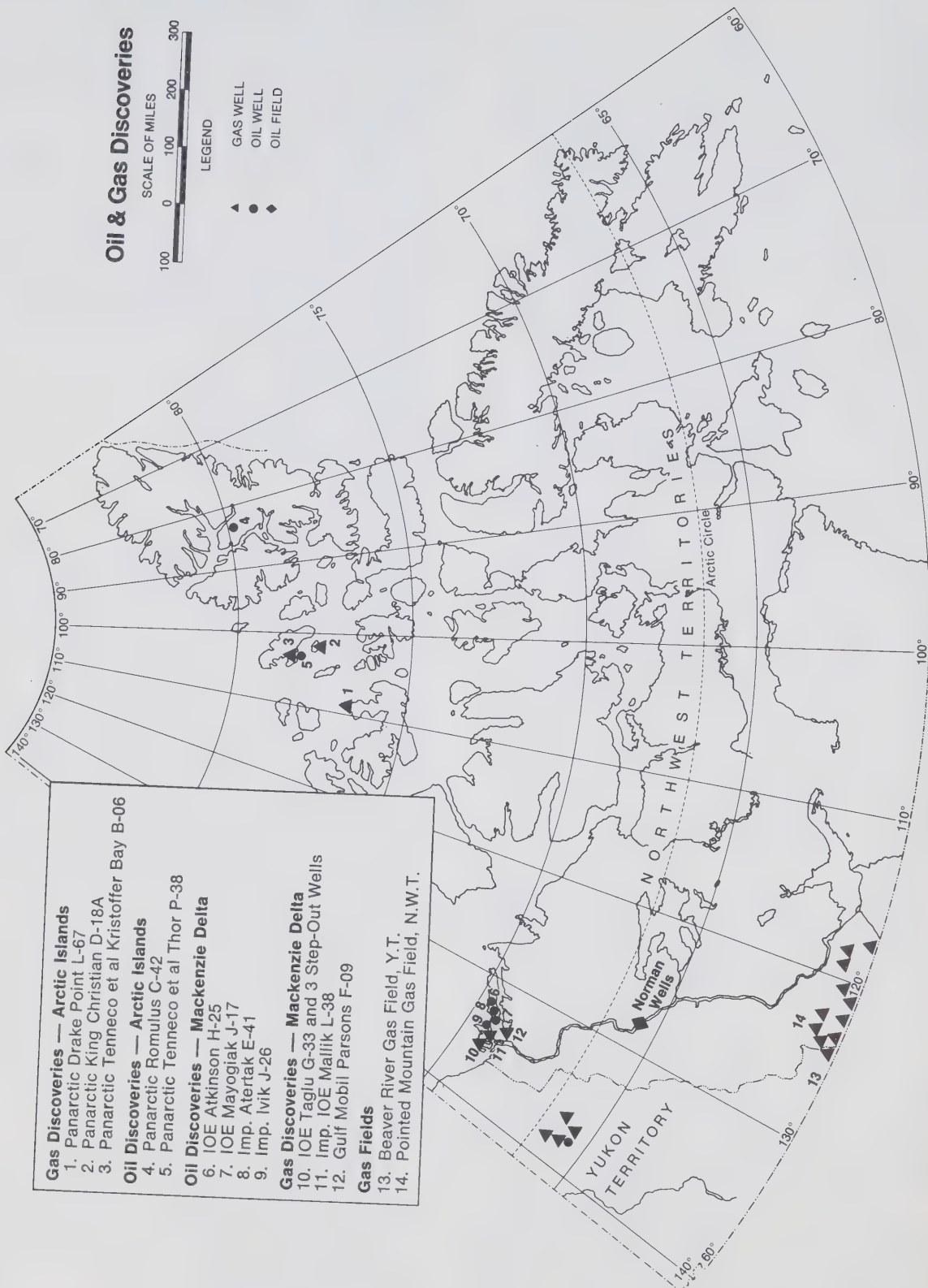
In August 1970 the Minister of Indian Affairs and Northern Development and the Minister of Energy, Mines and Resources announced proposed guidelines dealing with the construction and operation of oil and gas pipelines in the Yukon and the Northwest Territories. As a result of further studies, research and investigation, the government, on June 28, 1972, announced proposed expanded guidelines designed to assist those organizations interested in the possible construction of pipelines from northern Canada to southern markets.

The government invited the public to comment on the guidelines, with specific suggestions and comments on the concept and design of a transportation corridor that might include in the long run not only trunk pipelines, but also a highway, a railroad, electric power transmission lines, telecommunications facilities, etc.

The government set March 31, 1973 as the deadline for the receipt of comments from the public.

The guidelines apply to all aspects of oil and gas pipeline pre-construction, construction, operation and abandonment, including not only the actual right-of-way, but also all associated and ancillary facilities such as roads, docks, and landing areas, storage areas, airstrips, pumping or compressor stations and communications and maintenance structures.

The Federal Government decided that public hearings would be held under the Territorial Lands Act at an appropriate time after the Department of Indian Affairs and Northern Development received an application for a pipeline right-of-way covering Crown lands which are within the Yukon and Northwest Territories.



Map 2-1

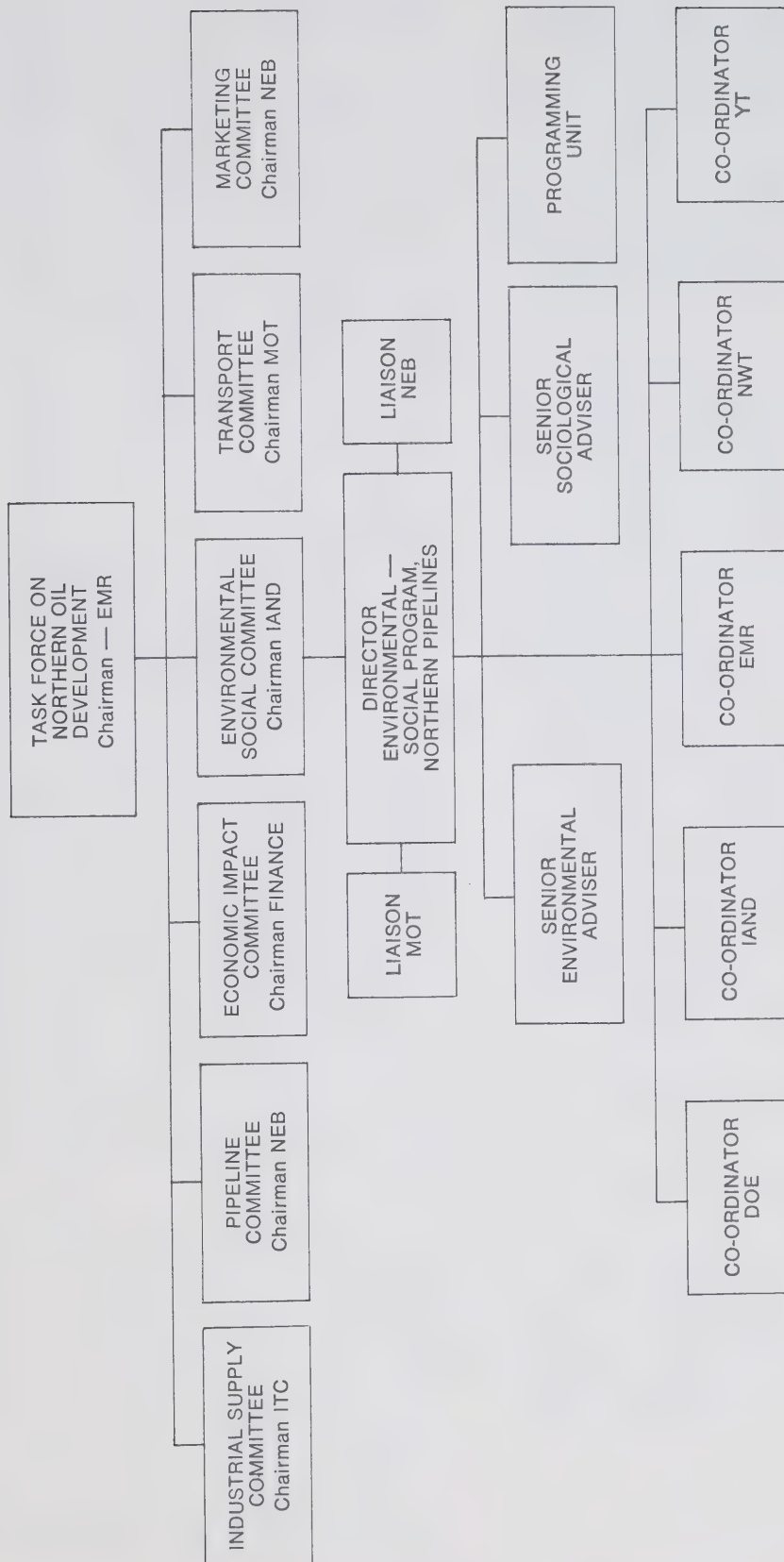


Table 2-1

The purpose of this enquiry would be to assess the regional, socio-economic and environmental implications arising out of the construction and operation of a major pipeline in the Territories.

These hearings are in addition to those required by law under the National Energy Board subsequent to an application by the Energy Board for a Certificate of Public Convenience and Necessity.

Any application for a pipeline right-of-way must be based on a viable project proposal and accompanied by detailed documentation of research pertaining to those areas of social and environmental concern as outlined in the Guidelines for Northern Pipelines.

2-2.1 Panarctic Oils Ltd.

In October 1967 a number of Canada's leading oil and mining firms joined with the Federal Government to form Panarctic Oils Ltd., to carry out a joint exploration program in the Arctic Islands.

Under the agreement the Federal Government has a 45 per cent equity with private capital contributing 55 per cent. Government and corporations are participating in equity on the same terms. All original shareholders have comparable priority in providing additional capital, when and if required.

The Federal Government, in addition, is owner of the mineral rights in the Arctic Islands and receives its nominal fees and rentals on exploration rights and royalties on production.

Panarctic acquired more than 44 million acres of oil and gas permits in the Arctic Islands. Its field exploration program commenced in 1968 when seismic and gravity surveys as well as geological studies were carried out in the Arctic Islands. Initial drilling began in the 1969 spring season on Melville Island. By the end of 1972 Panarctic had made four major gas discoveries, on Melville Island, at Drake Point, King Christian Island and on Ellef Rignes Island. The reserves delineated by the end of 1972 suggested the feasibility of a gas pipeline being constructed from the Arctic Islands down the coast of Hudson Bay to southern markets.

At the start of 1973 Panarctic was drilling at five other locations in the Arctic Islands and other companies were drilling an additional three wells on Panarctic lands.

Panarctic's Arctic permits cover petroleum and natural gas rights only. However, exploration is directed towards not only these hydrocarbon resources, but also sulphur, metallic minerals and other natural resources. Under the agreements, Panarctic management has 15 days' priority to stake claims on any mineral deposits located as a result of the Company's work. Only in the event of Panarctic deciding against staking of claims within that time limit would individual shareholders of that company on their own behalf have the right to stake claims.

Table 2-2

Norman Wells Production And Royalties

Year	Production	Value of Crude to Refinery	Average Well Head Price/Barrel	Crown Revenues
1958	457,086	856,449.51	1.83	234,001.65
1959	430,319	749,073.00	1.77	234,315.00
1960	468,545	619,257.00	1.37	175,981.00
1961	516,979	652,368.00	1.24	92,768.00
1962	566,168	642,095.00	1.10	133,329.00
1963	630,465	600,901.00	.72	69,882.00
1964	574,125	585,139.00	.98	51,258.00
1965	660,770	665,556.00	1.12	178,878.00
1966	741,476	852,549.00	1.15	213,571.00
1967	684,179	532,633.00	.82	106,229.00
1968	753,592	909,284.00	1.21	35,641.00
1969	500,508	347,202.00	.69	19,630.00
1970	846,003	1,141,596.00	1.35	244,072.00
1971	939,151	1,201,644.00	1.28	301,562.00
1972	958,956	1,082,725.00	1.20	99,461.00

2-2.2 Norman Wells

The existence of oil North of 60 has been known since 1789 when Alexander Mackenzie recorded the presence of oil seeps along the banks of the river that bears his name, near Norman Wells.

In 1890 other explorers recorded the discovery of oil seepages along the north shore of Great Slave Lake, and near Fort Good Hope, down-river from Fort Norman.

Encouraged by the results of a detailed study of the area, the Northwest Company, a subsidiary of Imperial Oil Limited, began drilling Discovery No. 1 in 1920. Oil was found in fractured shales at a depth of 783 feet and development drilling led to the discovery of oil in the underlying Kee Scarp reef, now the producing horizon at Norman Wells.

The field developed slowly until World War II created a great demand for petroleum products in northern Canada and Alaska. Many development wells were drilled in the early 1940's and the Canol crude oil pipeline, completed in 1944, linked the field to a refinery at Whitehorse. Gross production rose from 267,000 barrels in 1943 to 1,220,000 barrels in 1944. The pipeline operation was terminated the following year and since 1958 production has varied from 457,086 barrels with 1971 production being at 939,151 barrels.

Norman Wells oil reservoir is a coralline limestone reef located between an upper and lower shale series of Devonian age. The porous portion of the reef rests on a basal reef limestone about 100 feet thick, which extends over a wide area beyond the productive limits of the pool. The structure is monoclinical and dips in a southwesterly direction at an angle of approximately four degrees. Closure of the oil saturated section is formed by a pinching out of the reef on the updip side. On the downdip side edgewater limits the productive outline.

The average gross thickness of the oil saturated reef is 244 feet with the thickest section encountered being 388 feet. The effective productive outline of the Norman Wells pool is 3,800 acres.



Map 2-2

Information regarding porosity and permeability is limited. Cores were taken in several wells, but the entire section was cored and analysed from only one well (Mainland 37X). The weighted average porosity of the effective section in well 37X is 13.3 per cent and the average permeability to air is 10.5 millidarcys. The connate water saturation of the reservoir has not been determined but 25 per cent has been assigned for reserve estimates. The shrinkage is 0.813. On the basis of this data the Norman Wells field is estimated to contain 419 million barrels of oil-in-place. The field has produced about 12 million barrels, and the Canadian Petroleum Association estimates 48 million barrels of additional recoverable oil.

Of the Norman Wells refinery products, middle distillates are in largest demand. This leaves a surplus in lighter and heavier distillates. The lighter products are re-injected, while the heavier residual is burned. Additives and alkylates for blending are brought to the local refinery from Edmonton, Alberta, to provide premium motor and aviation gasoline for markets along the Mackenzie River and Arctic Coast.

Forecasts made by Imperial Oil Limited indicate that demands for petroleum products from the Norman Wells refinery will increase. Their studies also show that the supply of crude from the field will begin to decrease under natural depletion in the near future. To sustain productivity and meet forecast requirements a down-dip water injection scheme has been implemented and two additional producers were drilled in the summer of 1968.

2-2.3 Beaver River — Pointed Mountain

The Beaver River gas pool, on the Yukon-British Columbia border and the Pointed Mountain gas pool in the adjacent part of the Northwest Territories were discovered in 1958 and 1966 respectively by Pan American Petroleum Corporation and in January, 1967, Pan American entered in a gas development contract with Westcoast Transmission Company. A 24-inch gas pipeline extending north for 110 miles from the terminus of Westcoast Pipeline Company at Fort Nelson to the Beaver River gas pool was completed in 1970. A gas dehydrator plant and a gas gathering system in the Beaver River field went on stream in October, 1971. Initial gas deliveries from the Beaver River gas field in the Yukon section of the field exceeded 200 MMcf/d.

A second contract for the construction of a gas dehydrator plant at Pointed Mountain and a connecting pipeline to Beaver River was let and this section of the gas gathering facilities went on stream in August of 1972.

2-3.1 Sedimentary Geological Provinces

Canada North of 60 can be divided into seven major sedimentary areas: (See Map 2-2)

1. Interior Plains
2. Mackenzie Mountain Area
3. North Yukon Area
4. Arctic Lowlands
5. Franklinian Geosyncline

6. Sverdrup Basin
7. Arctic Coastal Plain

2-3.1.1 Interior Plains

This area is part of the large geologic province which covers mainland Canada between the Precambrian Shield and the Cordillera and extends southward into the United States. In the Northwest Territories mainland, this sedimentary area is underlain mainly by horizontal or gently dipping Lower Paleozoic, Devonian, Carboniferous and Cretaceous sediments that thicken southward into northern Alberta and westward into the Cordilleran Geosyncline. Regional unconformities lie at the base of the Paleozoic, Middle Devonian and late Lower Cretaceous.

On the basis of structure and stratigraphy, the Interior Plains North of 60 can be subdivided into three regions. From south to north, these are the Great Slave Plain, the Great Bear Plain and the Anderson Plain-Peel Plain-Peel Plateau region.

Geologically, the Great Slave Plain is the northern extension of areas that are producing oil and gas in the northern parts of Alberta and British Columbia; most of the exploratory drilling North of 60 has been in this area.

As a result of this drilling, the general geology is known. Strong topographic relief characterizes the surface of the Precambrian crystalline basement. These irregularities are partly infilled by porous Cambro-Ordovician sandstones. Overlying this is a sequence of Middle Devonian carbonates part of which is beogenic in origin and gives way laterally to evaporites. The gas discoveries have been in these carbonates which are an extension of the gas reservoir belt of northeastern British Columbia. The section above the Middle Devonian comprises shales with a few carbonate interbeds.

The Great Bear Plain is a west-dipping homocline of Ordovician, Silurian and Middle Devonian carbonate extensively exposed or overlain by a thin veneer of Cretaceous shale. North-trending uplifts which merge with the Franklin Mountains bring Ordovician, Silurian and Middle Devonian rocks to the surface.

The Anderson Plain is underlain by a west-dipping homocline that extends into the basin beneath the Peel Plain and Peel Plateau. The Cambrian rocks are predominantly shallow water, marine beds deposited under conditions of arid climate and restrictive circulation. They grade from porous sands and red beds in the east to red beds and salt in the central area to varicolored shale, gypsum and limestone in the west. The Ordovician and Silurian are a thick, partly porous dolomite which undergoes a facies change to shale on the west side of the Peel Plateau. Overlying this is a middle Devonian carbonate which passes eastward into evaporites and breccias and westward into shale and is in turn overlain by a cover of shale with some sandstone ranging in age from Upper Devonian to Upper Cretaceous.

2-3.1.2 Mackenzie Mountain Area

The Mackenzie Mountain Area embraces the Mackenzie and Franklin Mountains as well as two potential petroleum provinces, the Liard Plateau and the Mackenzie Plain. In the Liard Plateau, the valleys are synclines while the hills are complex folded and faulted anticlinal features with several doubly-plunging linked culminations. Deformation is considered to be Laramide.

Large quantities of gas have been found in a thick sequence of Middle Devonian carbonates where it occurs buried in the culminations of such structures at Beaver River and at Pointed Mountain under a cover of Upper Devonian and Carboniferous shales and sandstones.

Much of the Mackenzie Plain is characterized by extensive linear synclines and broad gentle anticlines, commonly linked in echelon and broken by faults of small displacement.

Porosity is known to be present in several horizons in the Mackenzie Plain. The Ordovician and Silurian beds are a thick, partly porous dolomite and the Middle Devonian breccias also carry porosity although some anhydrite plugging is known. The Upper Devonian Kee Scarp limestone and reefs underlie the northern part of the Mackenzie Plain and are the reservoir rock at the Norman Wells oilfield. Such reefs occur at the top of an extensive platform of bedded limestone and may reach several hundred feet in thickness.

2-3.1.3 Northern Yukon Area

The Northern Yukon Area includes a complex of varied structural trends surrounding the Old Crow Plain, Eagle Plain, and Arctic Plateau.

The Old Crow Plain has a cover of Quaternary and Tertiary sediments and little is known of the underlying section. The area is flanked on the south by metasediments and granites and on the other side by Devonian carbonate and Jurassic and Lower Cretaceous clastics.

Most of the Arctic Plateau beneath the cover Jurassic and Cretaceous shales and sandstones may be floored by low-grade metamorphic rocks. Mississippian limestones and Triassic sandstone intervene in the southwest and Permian, Carboniferous and possibly Devonian clastics occur in the northeast.

The Eagle Plain is a rectangular structural basin framed by areas of complex structure. These are the Richardson Mountains to the east, the Dave Lord Ridge to the north, and the Ogilvie Mountains to the west and south. Around the periphery of the basin the structures trend parallel to the adjacent areas while in the central area, they comprise north-trending, broad, open folds.

Overlying Cambrian siltstones and sandstones is a series of carbonates ranging in age from Ordovician to Middle Devonian that change facies to shale. This series is overlain by a thick sequence of Upper Devonian to Cretaceous shales and sandstones.

2-3.1.4 Arctic Lowlands

The Arctic Lowlands are divided by salients and inliers of Precambrian rocks into six basins: Victoria Strait Basin, Jones — Lancaster Basin, Melville Basin, Wollaston Basin, Foxe Basin, and the Banks Basin.

Porous Cambrian sandstones are present in some areas but the principal rocks of the Lowlands are limestones and dolomites that range in age from Middle Ordovician to Lower Devonian. Of these, the Cornwallis and Allen Bay dolomites are characterized by reefoid developments, vuggy porosity and bituminous residues. They are widely exposed in southerly regions of the Lowlands but are covered by Silurian to Lower Devonian limestones in the north and by beds as young as Tertiary in the west.

In the Melville Basin the Silurian is overlain by limestones and bituminous shales of the Middle Devonian Blue Fiord Formation. Thick Middle to Upper Devonian shales and sandstones constitute a cover. Isolated Upper Devonian reefs also occur and the trend may extend westward beneath the Cretaceous and Tertiary clastics of the Banks basin.

2-3.1.5 Franklinian Geosyncline

The Franklinian Geosyncline embraces miogeosynclinal rocks included in the Parry Islands, Cornwallis and Central Ellesmere Fold Belts, and rocks of eugeosynclinal character included in the Northern Ellesmere Fold Belt.

The Cornwallis Fold Belt is characterized by north-trending closely-folded anticlines separated by broad shallow synclines. Dome-like structures occur in the narrow margin where the north-trending folds are in conjunction with the east-trending folds of the Parry Islands Fold Belt.

Structures of the Parry Islands Fold Belt are long, sublinear, symmetric, gently-plunging east-trending folds which gradually decrease in amplitude southward toward the Arctic Lowlands.

The Central Ellesmere Fold Belt embraces a region of northeasterly trending folds and thrusts produced by Varisian and Laramide orogenies. In the southerly regions Variscan structures are broad open folds and Laramide tectonism appear to have been moderate. Both Variscan and Laramide structures are more intense in the north.

The Northern Ellesmere Fold Belt includes metamorphosed Precambrian eugeosynclinal rocks as well as acidic and basic intrusions.

Within the Franklinian geosyncline, a thick sedimentary sequence ranging in age from Ordovician to Devonian is present. The Ordovician, Silurian and Lower Devonian carbonates that underlie the Arctic Lowlands thicken northward into the geosyncline and grade into graptolitic shale.

The Ordovician Cornwallis Formation is very thick and extensive on Ellesmere Island and isolated outcrops occur within the Parry Islands Fold Belt. The upper part contains reefoid dolomites on Cornwallis and Bathurst Islands but is dense on Melville Island where it grades into shale.

The Upper Ordovician-Silurian Allen Bay Formation includes several zones of coarsely crystalline

porous dolomite. The overlying Read Bay Formation is mainly dense but the upper part includes biogenic, reefoid, and porous limestones. The facies change between these formations and the Cape Phillips shale is generally abrupt with several thousand feet of carbonate passing into shale within a few miles but on Cornwallis Island tongues of porous dolomite up to 100 feet thick extend 30 or 40 miles beyond the front.

On Ellesmere Island a carbonate bank occurs surrounded entirely by Cape Phillips clastics and similar banks are also known on Melville Island.

Potential Lower Devonian reservoirs are limestone and small bioherms of the upper Read Bay Formation and Sherard Osborn Formation. The Middle Devonian comprises mainly bedded carbonates with local biogenic and reefoid beds. The Lower and Middle Devonian carbonates also pass into shale.

The youngest rocks known in the Franklinian Geosyncline are late Middle Devonian shales and dense siltstones and Upper Devonian sandstone and shale, mainly non-marine in origin.

2-3.1.6 Sverdrup Basin

The Sverdrup Basin contains a thick sequence of late Paleozoic to early Tertiary strata that lie with profound unconformity on deformed older Paleozoic beds. The section may be as much as 40,000 feet thick.

Laramide folding and thrusting affected much of the Sverdrup Basin being most intense in the northeast part. West of the Ringnes Islands deformation is less intense, dips are generally less than five degrees, and the structure is a northeast plunging synclinorium with gentle folds radiating from the axis.

The Laramide strike is closely related to older Paleozoic deformations. On west-central Ellesmere Island Laramide structures parallel the Variscan trend and folds on much of the Axel Heiberg Island are aligned with those of the Caledonian and Variscan. These older belts appear to have produced differential rates of subsidence during the Mesozoic.

In the axial part of the basin there are at least two units of anhydrite, one of Carboniferous age and the other Permian. The evaporites intruded the overlying Mesozoic and Tertiary beds as domes, in diapiric folds, and along faults. Available evidence suggests that the lower evaporite is the principal source. No halite has been found either in the intrusives or where the evaporites are known in situ.

In eastern Sverdrup Basin, where the Triassic forms the exposed core of many folds, Pennsylvanian and Permian rocks constitute the potential reservoirs. The thick succession on Ellesmere Island includes limestone banks, locally, reefoid and isolated reef masses capped by black shale. The limestone grade westward into a thin shale and siltstone sequence constituting the axial part of the basin and eastward to marginal facies of sandstones and conglomerate.

Mesozoic sedimentation is characterized by basinal marine shales and siltstone with partly

porous marine sandstone intertonguing from the east and south margins and at some horizons from the northwest also. Tar sands are present in the basal part of the Triassic Bjoine Formation on Melville Island.

Gabbro sills and dykes intrude formations as young as Upper Cretaceous in the eastern part of the Sverdrup basin. Individual sills attain a thickness of 300 feet and adjacent strata may be metamorphosed to a distance of about 80 feet. The presence of numerous basic intrusives may not be entirely an adverse feature as they could produce effective traps on the flanks of folds.

2-3.1.7 Arctic Coastal Plain

This broad geologic province covers the north-western part of North America and much of it lies beneath the Beaufort Sea. The Canadian land portion includes parts of Banks and Prince Patrick Island and the northern parts of the outer Canadian Arctic Islands as well as a 10 to 20 mile wide strip of gently rolling terrain on the western part of the north coast, north of the Interior Plains and North Yukon Areas. The Arctic Coastal Plain is through-going into Alaska where the land portion widens to 150 miles because of the divergence between the mountainous chain which marks the southern boundary of the area and the seacoast.

Bedrock in the Arctic Coastal Plain is late Tertiary or Pleistocene non-marine sands and gravels. From drilling in the Mackenzie Delta and Alaska, it is known that beneath the cover lie non-marine Cretaceous beds which are underlain, in turn, by marine clastics of the Cretaceous, Jurassic and Triassic. An unconformity separates these rocks from the shales and limestones of the Carboniferous Lisburne Formation. Middle and Lower Paleozoic rocks are exposed in the mountainous areas south of the Arctic coastal Plain but it is doubtful that these extend very far north. The Carboniferous and Triassic are oil and gas reservoirs at the major discovery at Prudhoe Bay in Alaska.

The alluvium cover masks the structural geology of much of the area. In Alaska, long north-northwest trending anticlinal structures of Laramide origin have been mapped. The Prudhoe Bay discovery is on one of these.

Submarine scarps, also with a north-northwest alignment have been mapped in the Mackenzie Bay area and normal faults of small displacement occur on Prince Patrick Island.

The early history of the Mackenzie Delta is unknown. Fault scarps are present on the east and west sides suggesting that it may have been a graben for at least a part of its history.

2-4.1 Government Services and Requirements

All aspects of oil and gas operations in the Yukon and the Northwest Territories are administered by the Oil and Gas Sections, Oil and Minerals Division, Northern Natural Resources and Environment, Department of Indian Affairs and Northern Development, Ottawa.

It is the intent of the Department to provide a regulatory climate that will best encourage and provide for the orderly exploration and exploitation of oil and gas North of 60.

2-4.1.1 Oil and Gas Regulations

Regulations in effect for oil and gas administration are made pursuant to the Territorial Lands Act, and Public Lands Grants Act.

They include:

- Canada Oil and Gas Land Regulations
- Oil and Gas Land Order No. 1 — 1961 (revoked 1970)
- Oil and Gas Land Order No. 2 — 1961
- Oil and Gas Land Order No. 1 — 1962
- Oil and Gas Land Order No. 2 — 1962 (amended)

2-4.1.2 Canada Oil and Gas Production and Conservation Act

Regulations under this act came into effect June 6, 1961. The Regulations provided for an applicant to select a grid area from a master map held in the Oil and Minerals Division showing all grid areas already under permit and those still available. An applicant may apply for any grid area which is available for filing and be granted a permit entitling him to explore for oil and gas.

The applicant shall pay a fee of \$250.00 per permit and deposit money, bonds, or a promissory note to guarantee that exploratory work required during the life of the permit is \$2.90 per acre on the mainland, \$2.65 per acre for the Arctic Islands and \$2.70 for water permits. The work expenditure requirement commences at five cents per acre and escalates to 50 cents per acre during the term of the permit.

If the permittee considers it necessary to evaluate adjacent areas as well as his own permits, he may be permitted to carry out this exploration regardless of whether the areas are open or have been allotted to another permittee. The deposits, which are required to ensure work, are returned upon satisfactory performance.

Permits on the mainland are valid for three, four or six years depending on location with six renewals of one year each. Marine permits under seacoast waters are valid for six years with six renewals of one year each; north of latitude 70 all permits issued prior to 1968 are valid for eight years with six renewal terms. Permits issued in 1968 and later are valid for six years with six renewal periods.

A permittee may acquire leases comprising in aggregate, not more than 50 per cent of the sections in each grid or half-grid for which he has a permit. The minimum size for leases is one section, and the maximum sizes are five sections by three sections or four sections by four sections. Leases are valid for 21 years and are renewable. The rental is 50 cents per acre for the first year, and in the second and subsequent years is \$1.00 per acre. Up to 50 per cent of the annual rental can be in the form of unallocated work expenditures carried forward from the permit stage, and these surpluses may be credited against the rental until the expiration of

the lease or until the start of commercial oil or gas production.

The 50 per cent of the permit not acquired under lease by the permittee returns to the Crown.

On October 12, 1961, two Oil and Gas Land Orders were issued granting the permittee an option to acquire the Crown's portion on the payment of an additional royalty which varies with location and production rates.

If the option is not exercised, the lands returned to the Crown may be sold by tender as oil and gas leases by one of three methods:- cash bonus, work bonus or cash bonus plus and undertaking to drill a well to a specified depth.

On September 17, 1962, a third land order was issued setting out methods for disposal by permit of lands returned to the Crown. The methods to be used are sale by tender of single permits or blocks of permits for a work bonus or a cash bonus.

On December 22, 1964, Oil and Gas Land Order No. 2 — 1961 was amended to provide for lessees to deposit with the Chief, money, bonds, or an approved note of a value equal to the amount that the lessee undertakes to expend for exploration work on the lease area within one or more fixed periods.

In 1971 a further revision of Sections 38 and 109 provided notice of defaults on renewals. Under the amendment, a permittee will be given notice of default and a 90-day period in which to submit his deposits for the next work period.

Safety inspections of all oil well drilling rigs is carried out by the Inspection Services Unit of the Department of Indian Affairs and Northern Development.

2-4.1.3 Exploration Requirements and Federal Services.

Certain federal agencies are concerned with exploration on Canada lands and must be notified prior to the commencement of any exploration activity. The operator or permittee — not the contractor, is responsible for providing the requisite advance notice of planned programs to these agencies by writing directly to them.

For offshore programs the Regional Director of Resources at Yellowknife, Northwest Territories, must be informed with respect to each program in addition to the Oil and Mineral Division. He will communicate with every department and agency on the need-to-know basis with respect to Marine Geophysical Programs. In the case of the Hudson Bay region, operators must also inform the National Research Council of proposed operations when under-taken during the summer months. Circumstances may be such that other agencies should be notified as well, and these are listed on the following pages, together with the names of persons who can be of assistance. For example, since operators are responsible for any damage they may cause to underwater commercial cables, it is recommended that they contact the Canadian Hydrographic Service for cable-lay data covering the area over which the work is to be performed. Similarly, the

Customs and Excise Department should be contracted by the importing company if vessels or equipment are to be brought in from abroad.

2-4.1.4 Department of Indian Affairs and Northern Development

1. Pursuant to Section 52 of the regulations under the Canada Oil and Gas Production and Conservation Act, "Notice of Commencement of Exploratory Work" must be filed 15 days prior to commencement of proposed exploratory programs (geophysical, geological and research) on the Mainland in the Northwest Territories and Yukon Territory and Arctic Islands, and 45 days prior to commencement of geophysical work on offshore areas with the, Oil and Gas Land and Exploration Section
Oil and Mineral Division
Department of Indian Affairs and Northern Development
112 - 11th Avenue S.E.
Calgary, Alberta T2G 0X5
Phone: (403) 264-0201

2. Drilling Authority and advice on drilling matters can be obtained from the District Conservation Engineer for the District.

3. Information and assistance may be obtained from:
Chief,
Oil & Mineral Division,
Northern Natural Resources & Environment
Department of Indian Affairs and Northern Development,
400 Laurier Avenue W.,
Ottawa, Ontario K1A 0H4
Name: Dr. H. W. Woodward,
Phone: (613) 992-0223

4. Advice on exploratory programs and operation matters may be obtained from:
Operations Supervisor,
Oil and Mineral Division,
Northern Natural Resources & Environment,
Department of Indian Affairs and Northern Development,
Ottawa, Ontario K1A 0H4
Name: S. A. Kanik
Phone: (613) 992-0921

5. A Land Use Permit must be acquired for every land use operation, including drilling operations. Information and advice on the Land Use Regulations and Land Use Permits can be obtained

For the Northwest Territories:
Regional Director of Resources,
Department of Indian Affairs and Northern Development,
P.O. Box 1500,
Yellowknife, N.W.T.
Name: G. B. Armstrong,
Phone: (403) 873-4421

For the Yukon Territory:
Regional Director of Resources,
Department of Indian Affairs and Northern Development,
Room 211,
Federal Building,
Whitehorse, Y.T.
Name: B. J. Trevor,
Phone: (403) 667-7861

2-4.1.5 Department of The Environment

Resource Development Branch

Advance notice of 90 days is required before the start of a marine seismic survey involving the use of high explosives, in the event that qualified observers are needed. Nominal advance notice of 15 days to the Regional Director is required before the start of a seismic survey in which a source of acoustical energy other than high explosives is to be used.

Written notices should be sent to the appropriate Regional Director of Fisheries with a copy to:
Assistant Deputy Minister
Environmental Protection Service
Department of the Environment
Fontaine Building
Hull, Quebec
Name: K. C. Lucas
Phone: (613) 997-8041

Information regarding the Department's requirements can also be obtained from:
A/Director,
Resource Development Branch.
Name: E. W. Burridge
Phone: (613) 996-0701

The address of the Regional Director responsible for all fresh water lakes in the Northwest Territories is:

C. McEwan,
114 Gary Street,
Winnipeg 1, Manitoba
Phone: (204) 946-8101

In the Yukon Territory is:
W. R. Hourston,
1155 Robson Street,
Vancouver 5, B.C.
Phone: (604) 666-1671

Information concerning wildlife such as the locations of migratory bird sanctuaries and National Wildlife Areas may be obtained from:

Director,
Canadian Wildlife Service,
Department of The Environment,
Fontaine Building,
Hull, Québec.
Attention: N. G. Perret
Phone: (613) 992-5305

2-4.1.6 Atmospheric Environment Service

Requests for information and assistance on meteorological and sea-ice data, climatology, weather forecasting, meteorological instruments and

research may be directed to:
 Assistant Deputy Minister
 Atmospheric Environment Service
 Department of the Environment
 4905 Dufferin Street
 Toronto, Ontario
 Name: J. R. H. Noble
 Phone: (416) 667-4774

Information may also be obtained through the Meteorological Liaison Officer in Ottawa. This position is filled on a rotation basis and the name of the officer is subject to change. Inquiries in Ottawa may be directed to:
 Liaison Meteorologist,
 Department of the Environment,
 Fontaine Building,
 Hull, Quebec.
 Name: D. J. Wright
 Phone: (613) 996-0807

Marine Sciences Branch

In addition to providing the commercial-cable lay data, the Canadian Hydrographic Service publishes charts of Canadian coastal waters, and information concerning these may be obtained from:
 Canadian Hydrographic Service,
 Marine Sciences Branch
 Attention: W. J. Covey
 Phone: (613) 994-9155

Information concerning charts showing Canada's Territorial Sea and Fishing Zone Limits and related data may be obtained from:
 Canadian Hydrographic Service,
 Marine Sciences Branch
 Attention: E. J. Cooper,
 Phone: (613) 994-5411

Information on physical oceanography may be obtained from:
 Canadian Oceanographic Data Centre,
 Marine Sciences Branch
 Attention: C. M. Cross
 Phone: (613) 992-3940

Information on tides may be obtained from:
 Tides and Water Levels,
 Marine Sciences Branch
 Attention: G. C. Dohler
 Phone: (613) 994-9122

Information on hydrographic surveys and control data in the western Arctic regions may be obtained from:
 Regional Hydrographer,
 Canadian Hydrographic Service,
 512 Federal Building
 Victoria, British Columbia
 Name: M. Bolton
 Phone: (604) 338-3188

Information on hydrographic surveys and control data in the eastern Arctic may be obtained from:
 Regional Hydrographer,
 Canadian Hydrographic Service,
 Atlantic Oceanography Laboratory,
 Bedford Institute,
 Dartmouth, Nova Scotia.
 Name: R. C. Melanson
 Phone: (902) 426-3497

2-4.1.7 Department of National Defence

Maritime Commanders

The appropriate Office of Maritime Command will be advised on the need-to-know basis by the Regional Director of Resources of any exploration program proposed for the offshore.

Operations in Baffin Bay, and Arctic waters east of longitude 105 West are handled by the office of: Commander Maritime Command, Department of National Defence, F.M.O. HMC Dockyard, Halifax, Nova Scotia.

Operations in Arctic waters west of longitude 105 West are handled by the office of: Maritime Commander (Pacific) Department of National Defence, F.M.O. HMC Dockyard, Victoria, British Columbia

2-4.1.8 Ministry of Transport

Aids to Navigation Division

At least 60 days notice is required by this Division before the commencement of any offshore exploration program, in order that appropriate local Notices to Shipping and national Notices to Mariners may be issued. These Notices are subsequently copied into related foreign publications. The Division also indicates the requirement for any aids to navigational devices that may be necessary for the program.

Advance notice of 90 days is required in any case where drilling involves the territorial sea, in order for approval to be granted under the Navigable Waters Protection Act.

All communications on these matters should be directed to:

Chief, Aids to Navigation,
 Marine Works Branch,
 Ministry of Transport,
 Ottawa, Ontario.
 Phone: (613) 992-2736

In addition, there are a number of Departmental officers who may be contacted in the field should the need arise. Their titles and addresses are given below:

District Marine Agent,
 Ministry of Transport,
 P.O. Box 310, Uppertown,
 Quebec 4, Quebec
 (This office handles Hudson Bay)
 District Manager,
 Ministry of Transport,
 P.O. Box 155,
 Hay River, N.W.T.
 Phone: (403) 874-2331

Marine Operations Branch

This agency directs the operations of the Canadian Coast Guard which has major responsibilities in two areas of concern to offshore operations: support of shipping in ice-congested waters, and marine search and rescue.

If operations are being contemplated for areas

where ice may be a problem and where ice-breaker or other support may be desired, there should be consultation with the Director of Marine Operations as long in advance as possible. This is particularly important in the case of Arctic and Hudson Bay operations where the planning of ice-breaker disposition is usually done six months in advance of the season.

Further information and assistance may be obtained from:

Director,
Marine Operations Branch,
Ministry of Transport,
Ottawa, Ontario.
Phone: (613) 992-4209

Marine Regulations Branch

This Branch includes the Steamship Inspection Division and the Nautical and Pilotage Division. The responsibilities of the former Division include inspection and certification of vessels under the Canada Shipping Act, oil pollution by vessels, and safety, pilotage, marine accident investigation and inquiries, salvage, marine personnel and navigational safety matters. This last includes the establishment of restricted navigation areas and routing of ships.

Further information and assistance may be obtained from:

Director,
Marine Regulations Branch,
Ministry of Transport,
Ottawa, Ontario.
Name: R. R. Macquillivray
Phone: (613) 992-8892

Information with regard to safety of life at sea and acceptable standards of seaworthiness may be referred to:

Chairman,
Board of Steamship Inspection,
Marine Regulations Branch
Name: W. E. Harrison
Phone: (613) 992-1312

2-4.1.9 Department of Communications

Telecommunications Regulation Branch

The responsibilities of this agency include the development of technical standards, the selection and coordination of radio frequencies, and the licensing of all classes of radio stations except broadcasting.

An operator contemplating the use of radio communications in his offshore activities should make application for licensing of any radio station in Canada or on board any Canadian vessel involved at least six weeks before the proposed in-service date of the communication facility. Details as to the licensing requirements and the necessary application forms may be obtained from the Regional Superintendent, Telecommunications Regulations Branch, Department of Communications:

Oil companies in Western Canada may contact:
Radio Superintendent,
Telecommunications Regulation Branch,
Department of Communications,
Federal Building,
Edmonton, Alberta.

Name: L. E. Nelson
Phone: (403) 424-0251 (Extension 334)

If need be, the following persons in Ottawa may be contacted for assistance:

Director,
Telecommunications Regulation Branch,
Department of Communications,
Ottawa, Ontario.
Name: W. J. Wilson
Phone: (613) 992-0840

Advice in determining communication requirements and the necessary applications for licence may also be obtained from:

Chief,
Radio Authorization and Enforcement Division,
Department of Communications,
Ottawa, Ontario.
Name: A. G. E. Argue
Phone: (613) 992-3427

2-4.1.10 Department of Energy, Mines and Resources

Surveys and Mapping Branch

Information on the systems, methods and equipment utilized in positioning and surveying with respect to exploration work may be subject to review by this agency. Moreover, legal surveys must be made in accordance with instructions of the Surveyor General.

Inquiries concerning surveying may be directed to:

Surveyor General,
Legal Surveys Division,
Surveys and Mapping Branch,
Department of Energy, Mines and Resources,
Ottawa, Ontario.
Name: R. Slessor
Phone: (613) 994-9174

Information concerning coastal control surveys may be obtained from:

Geodetic Survey Division
Surveys and Mapping Branch,
Department of Energy, Mines and Resources,
Ottawa, Ontario.
Attention: C. E. Hoganson
Phone: (613) 994-5079

When requesting control survey data, the enquiries should define the area involved by latitude and longitude. In the case of a large area, it is important to state priorities within the area to facilitate processing.

Resource Management and Conservation Branch

The Resource Management and Conservation Branch is responsible for the administration of the federal interests in the mineral resources off Canada's east and west seacoasts and in the Hudson Bay and Hudson Strait regions.

All correspondence should be addressed to:
 Director,
 Resource Management and Conservation Branch,
 Department of Energy, Mines and Resources,
 Ottawa, Ontario.
 Name: D. G. Crosby
 Phone: (613) 994-5065

Surveys and Mapping Branch

Air photographs covering all portions of Canada may be obtained from:
 National Air Photo Library,
 Surveys and Mapping Branch,
 Department of Energy, Mines and Resources,
 Ottawa, Ontario.
 Attention: G. H. Whitcher
 Phone: (613) 994-5433

Topographic maps, indices charts, atlases and numerous other map publications may be obtained from:
 Map Distribution Office,
 Surveys and Mapping Branch,
 Department of Energy, Mines and Resources,
 Ottawa, Ontario.
 Attention: G. A. Clemmer
 Phone: (613) 994-9663

Geological Survey of Canada

The Geological Survey of Canada carries out systematic geological and geophysical surveys in the sedimentary basins of Canada, including parts of the regions offshore from the east and west coasts, in Hudson Bay, and in the Arctic Islands.

Inquiries with regard to the operations and publications of the Geological Survey should be made to:

Director,
 Geological Survey of Canada,
 Department of Energy, Mines and Resources,
 Ottawa, Ontario.
 Phone: (613) 994-5817
or to:
 Director,
 Institute of Sedimentary and Petroleum Geology,
 Geological Survey of Canada
 Department of Energy, Mines and Resources,
 Calgary, Alberta
 Name: D. J. McLaren
 Phone: (403) 284-0110

Polar Continental Shelf Project

The Polar Continental Shelf Project is a continuous investigation of the continental shelf fringing the Arctic coast of Canada, together with adjacent parts of the Arctic Ocean basin, the islands of the Canadian Arctic Archipelago and the waters between them, and other areas of special interest.

Inquiries regarding surveys and scientific studies in Arctic areas may be directed to:

Co-ordinator,
 Polar Continental Shelf Project,
 Department of Energy, Mines and Resources,
 Ottawa, Ontario.
 Name: G. Hobson
 Phone: (613) 996-3388

2-4.1.11 National Research Council

Space Research Facilities Branch

Operators planning offshore activities in the Hudson Bay region must inform the following agency of the National Research Council well in advance since rockets are fired on a year round basis from the Churchill Research Range:

Head,
 Range Section,
 Space Research Facilities Branch,
 National Research Council,
 Ottawa, Ontario K1A 0R6
 Name: Z. R. Charko
 Phone: (613) 993-9385

Operators active in the Hudson Bay region are also required to co-ordinate their field activities with:

General Superintendent,
 Churchill Research Range,
 National Research Council,
 Fort Churchill, Manitoba.
 Name: T. W. McGrath,
 Phone: (204) 956-3010

Rockets are also launched from time to time from the facilities at Resolute Bay, N.W.T. and operators with exploration work planned for this vicinity are urged to co-ordinate their activities with the National Research Council.

2-4.1.12 Department of National Revenue

Customs and Excise

The Port Administration administers that portion of the Canada Shipping Act that relates to the coasting trade. In this connection, any company importing ships or specialized plant and equipment for exploration work on Canada's seacoasts may obtain information, assistance and such other contacts as may be necessary in Customs and Excise from:

Director,
 Port Administration Division,
 Customs and Excise,
 Department of National Revenue,
 Ottawa, Ontario.
 Name: M. A. Gallup
 Phone: (613) 992-4952

2-4.1.13 Department of Manpower and Immigration

Canada Immigration Division

Inquiries should be directed to:
 Department of Manpower and Immigration,
 Home Services Branch,
 Canada Immigration Division,
 Admission Section,
 Ottawa, Ontario.
 Attention: Mr. G. E. White
 Phone: (613) 992-3305

The Calgary and Edmonton offices of the Department of Manpower and Immigration can answer any queries regarding entry into the Northwest Territories. The Vancouver office can respond to queries for entry into the Yukon Territory.

At Tuktoyaktuk, a local R.C.M.P. officer is also a representative of the Department of Manpower and Immigration and can clear entry into Canada via Tuk.

At Inuvik, the Customs Department is also Departmental representative for Manpower and Immigration and can be contacted by telephone if prior arrangements are necessary. There is no representative at Aklavik; in the event that a seismic crew prefers to land at Aklavik, arrangements must be made with the Inuvik representative.

2-5.1 Publication Sources

Many maps dealing with the northern resource activities are published by the Division and are available from the Oil and Gas Land and Exploration Section, Calgary, Alberta, or from the Chief, Oil and Mineral Division, Ottawa. The Oil and Mineral Division publishes a list of maps which may be obtained from either of the above sources.

The following reports may be obtained from Information Canada or the Oil and Gas Land and Exploration Section, Calgary. Pre-payment is required.

Schedule of Wells 1920-1960	— \$3.00
Schedule of Wells 1920-1961	— 4.00
Schedule of Wells 1920-1963	— 4.00
Schedule of Wells 1920-1964	— 2.00
Schedule of Wells 1965	— 3.00
Schedule of Wells 1966	— 3.00
Schedule of Wells 1967	— 2.50
Schedule of Wells 1968	— 2.50
Schedule of Wells 1969	— 2.50
Schedule of Wells 1970	— 2.50
Schedule of Wells 1921-1971	— 10.00
Oil and Gas Statistical Report No. 2 (1961-1970)	— In preparation
"Technical Reports Available for Inspection 1973", (Geological and Geophysical Reports released from confidential status are available for public inspection only in the office of the Oil and Gas Land and Exploration Section of this Department in Calgary).	— No charge

2-5.1.1 Other Sources of Information

Information on northern resources activities can be obtained from the Chief, Oil and Mineral Division, Department of IAND, 400 Laurier Ave. West, Ottawa. All cores and samples from wells drilled on Canada lands are stored at the Institute of Petroleum and Sedimentary Geology, 3303 - 33rd. St. N.W., Calgary, Alberta, T2L 2A7. Specialized and technical literature pertaining to Northern Canada can be purchased or pursued at the following government agencies:

- (a) Northern Co-ordination Division Library, Department of Indian Affairs and Northern Development, 400 Laurier Avenue West, Ottawa, Ontario.
- (b) Department of Energy, Mines and Resources
 1. Geological Survey of Canada — Ottawa, Ontario and Vancouver, B.C.
 - Institute of Sedimentary and Petroleum Geology — Calgary, Alberta.

2. Marine Sciences Branch, Bedford Oceanography Institute — Dartmouth, N.S.

3. Surveys and Mapping Branch — Ottawa, Ontario
- (c) Defence Research Board, Scientific Information Service — Ottawa.

- (d) Ministry of Transport

1. Marine Works Branch — Ottawa, Ontario

2. Marine Operations Branch — Ottawa, Ontario

3. Civil Aviation Branch — Winnipeg, Manitoba.

- (e) Arctic Institute of North America — Montreal, Quebec.

- (f) National Research Council — Ottawa, Ontario.

1. Dominion Observatories Branch — Ottawa, Ontario.

- (g) The following brochures published by this Department may be available in some Public Libraries:

- i Guide to Northern Non-Renewable Resources
- ii Communication and Transportation Facilities
Queen Elizabeth Group — Arctic Islands
- iii Resource Management Division — Responsibilities and Administration
- iv Oil and Gas Canada Lands — Volume No. 2
- v Oil and Gas Canada Lands — Edition No. 3
- vi Oil and Gas in the Yukon and Northwest Territories — Edition No. 4 — 1967
- vii Oil and Gas — North of 60 — 1968
- viii Oil and Gas — North of 60 — 1969
- ix Oil and Gas — North of 60 — 1970
- x Oil and Gas Activities 1971

Acreage Held Under Oil & Gas Permit Yukon Territory and Northwest Territories

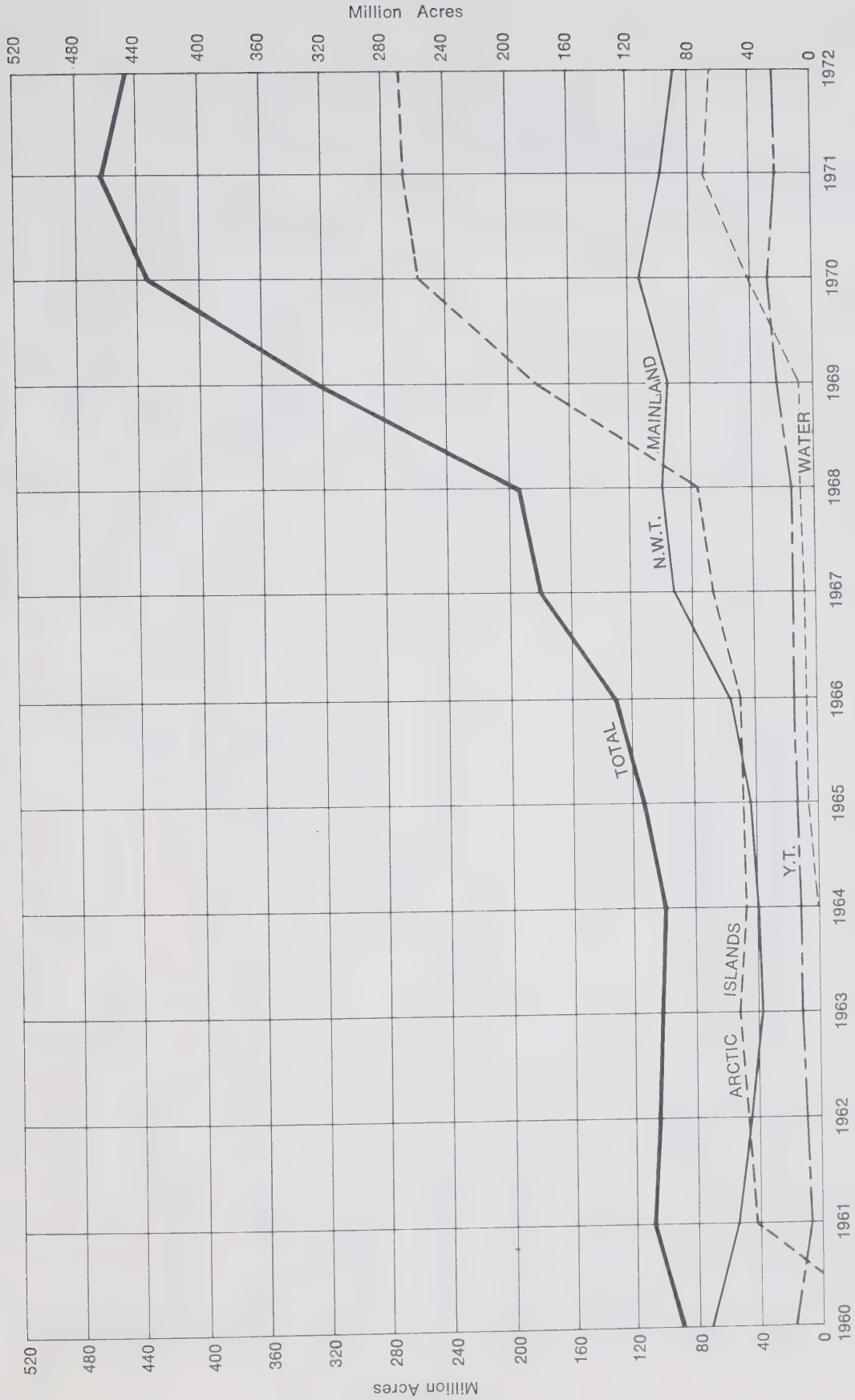


Fig. 2-1

Yukon Territory — Northwest Territories
Acreage Under Lease by Year

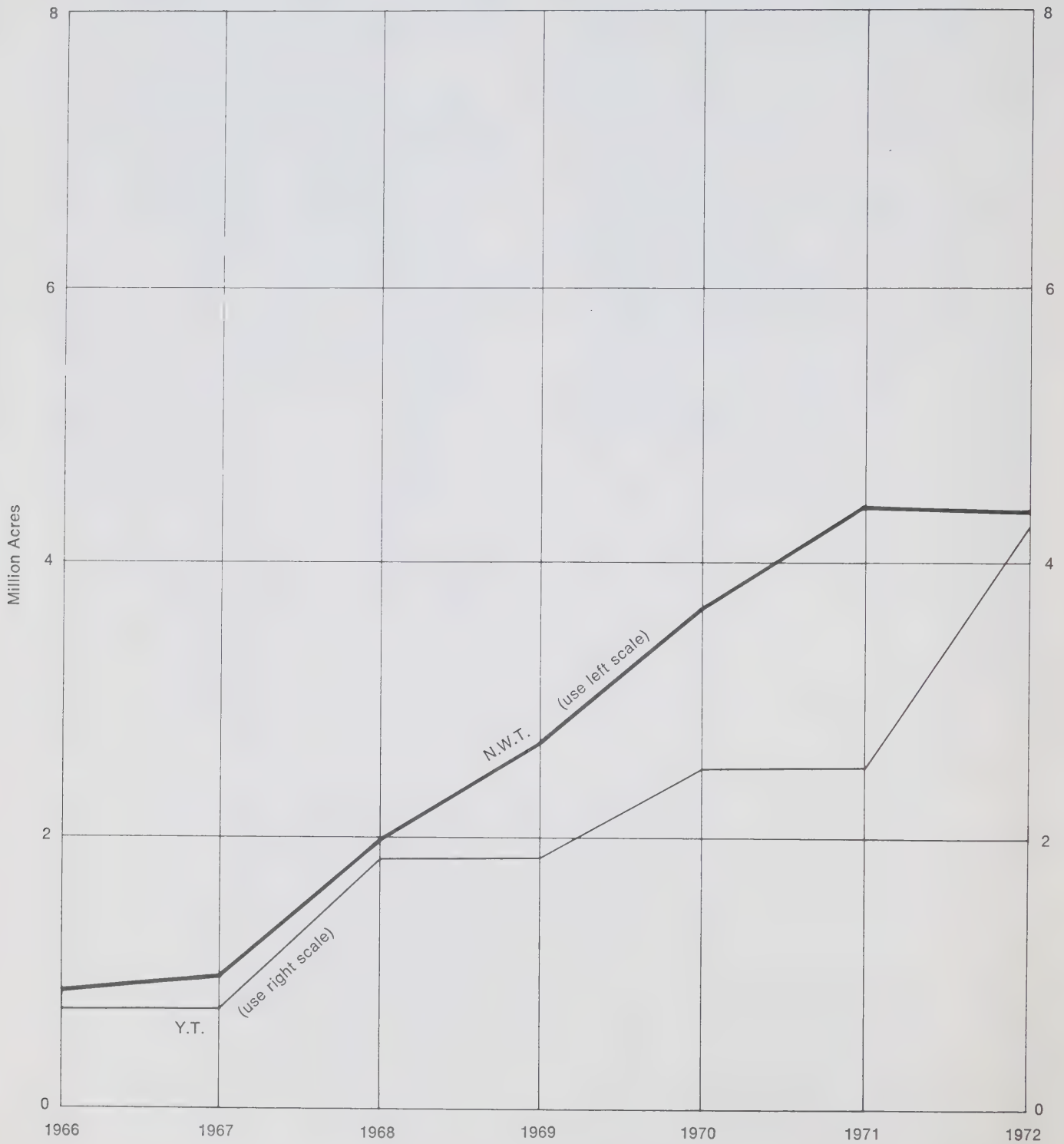


Fig. 2-2

Oil & Gas Exploration Expenditures

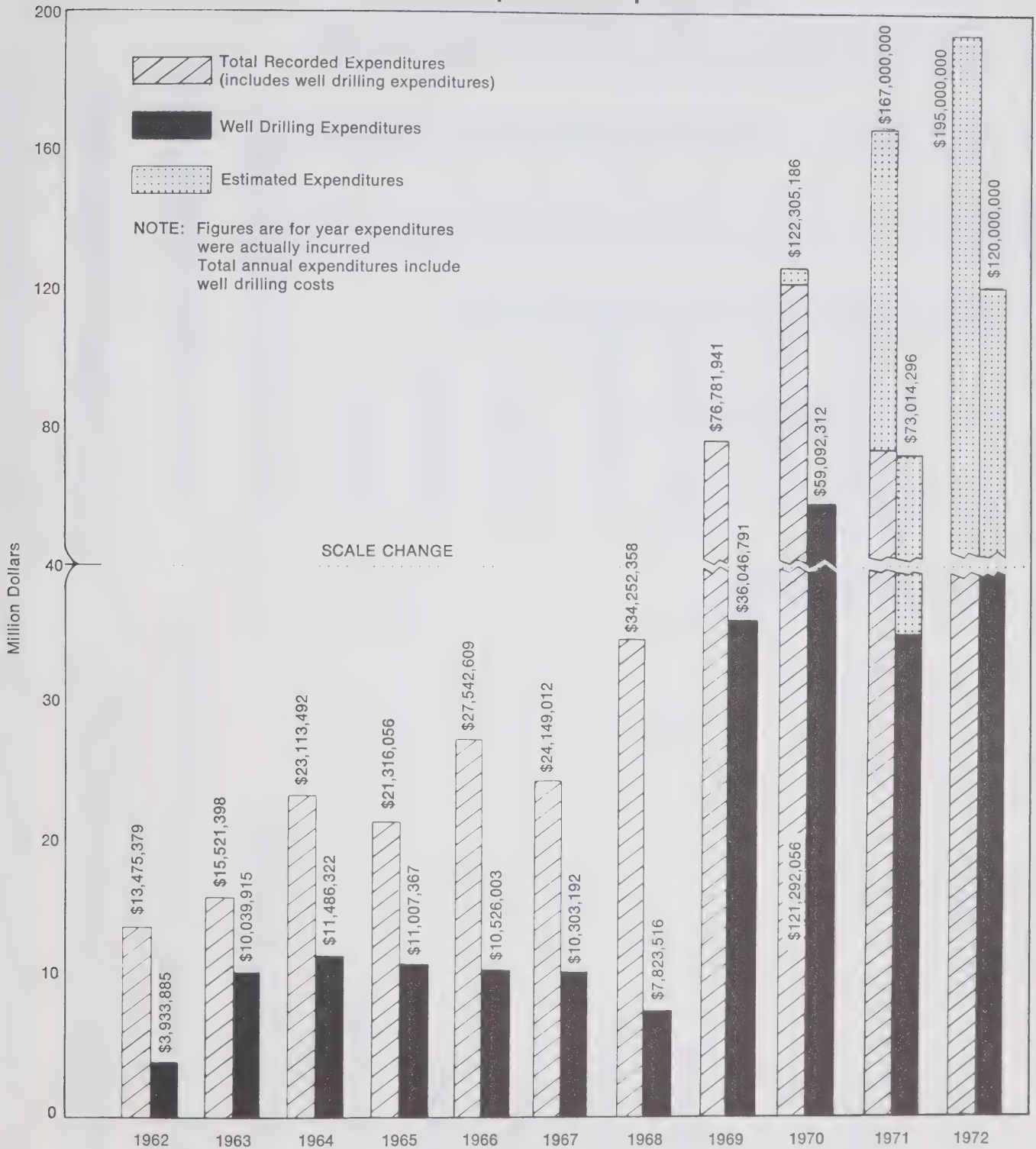


Fig. 2-3

Exploration Activity
Yukon Territory and Northwest Territories

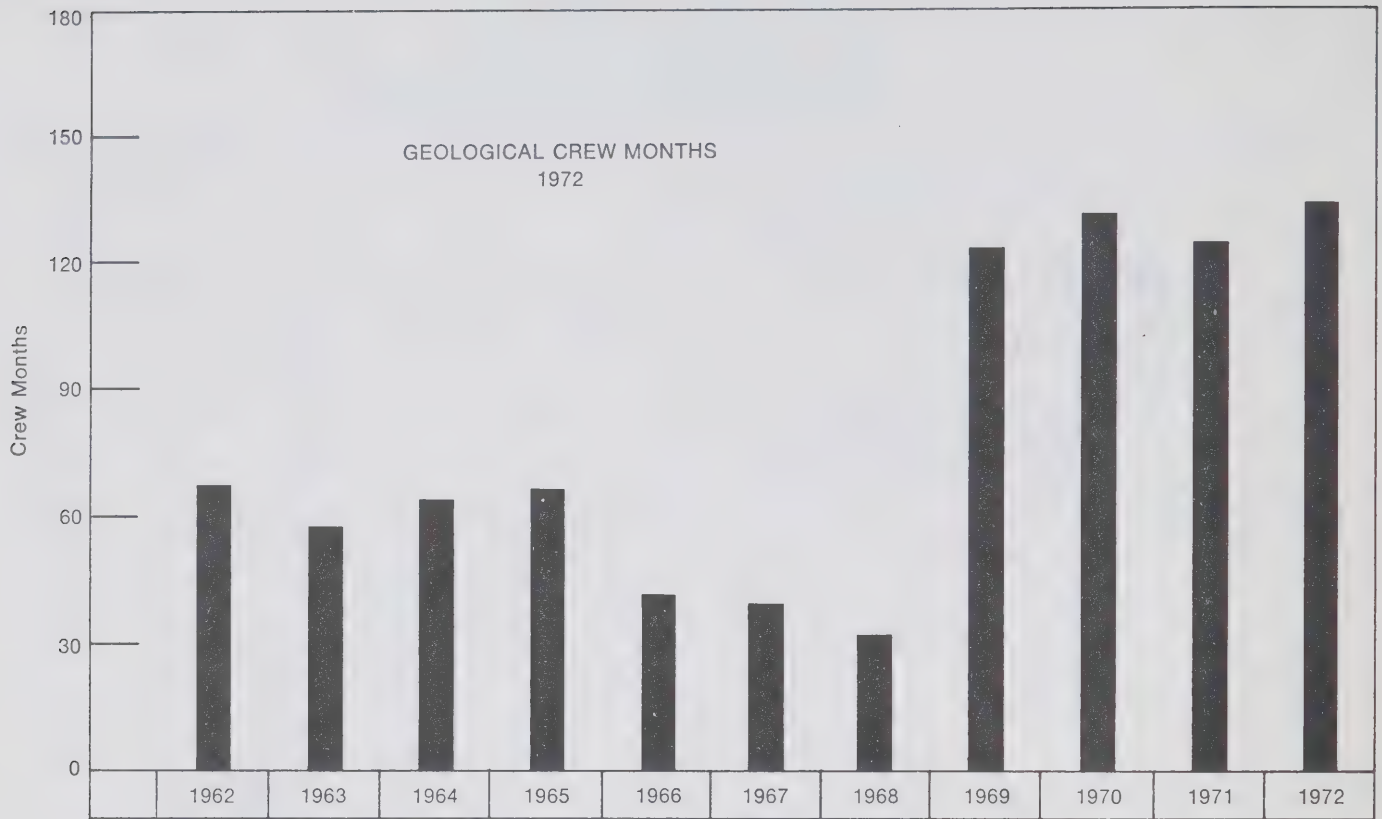


Fig. 2-4

Wells Drilled
Yukon Territory — Northwest Territories
Number of Wells Drilled to end 1972, 651

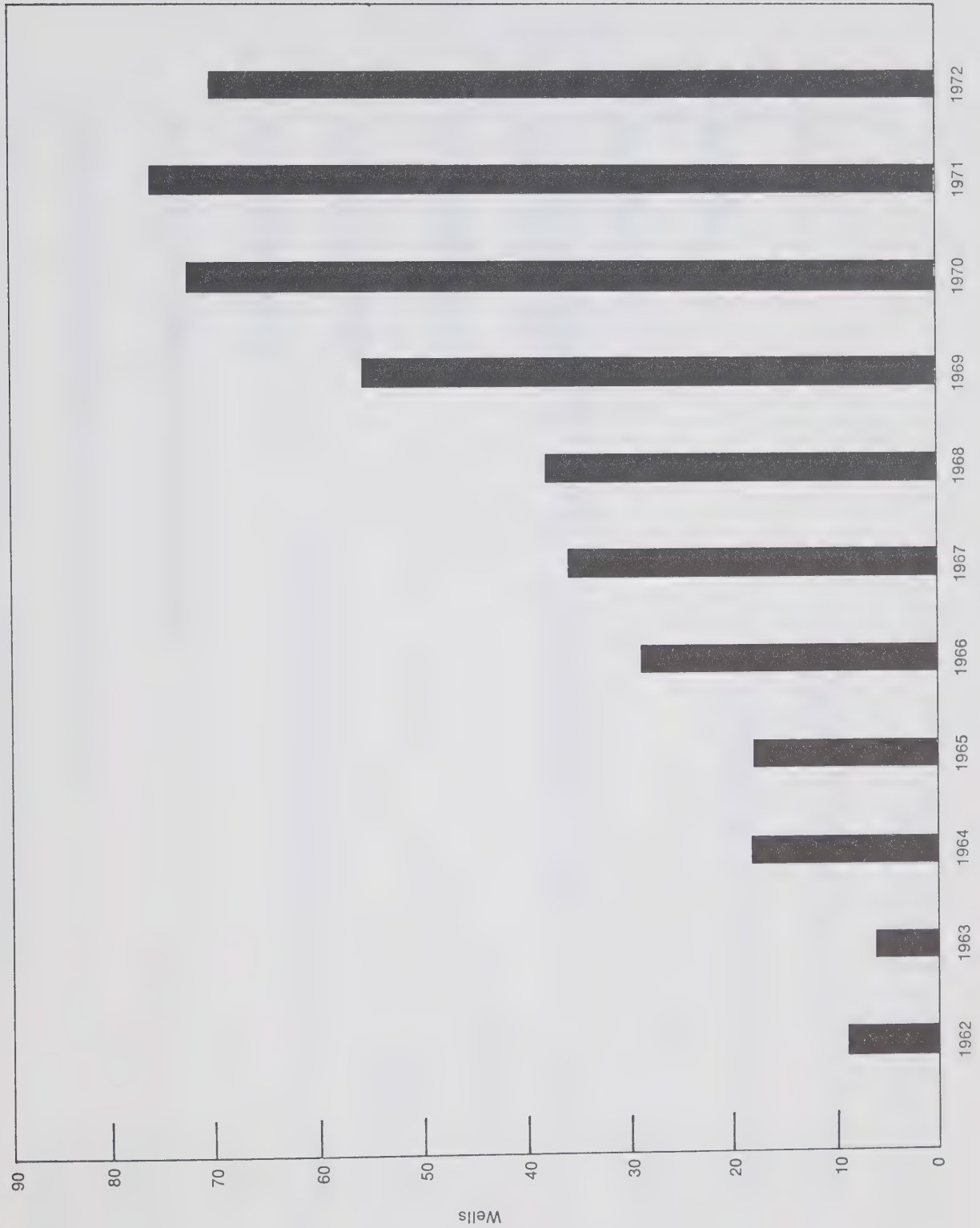


Fig. 2-5

Footage Drilled
Yukon Territory and Northwest Territories

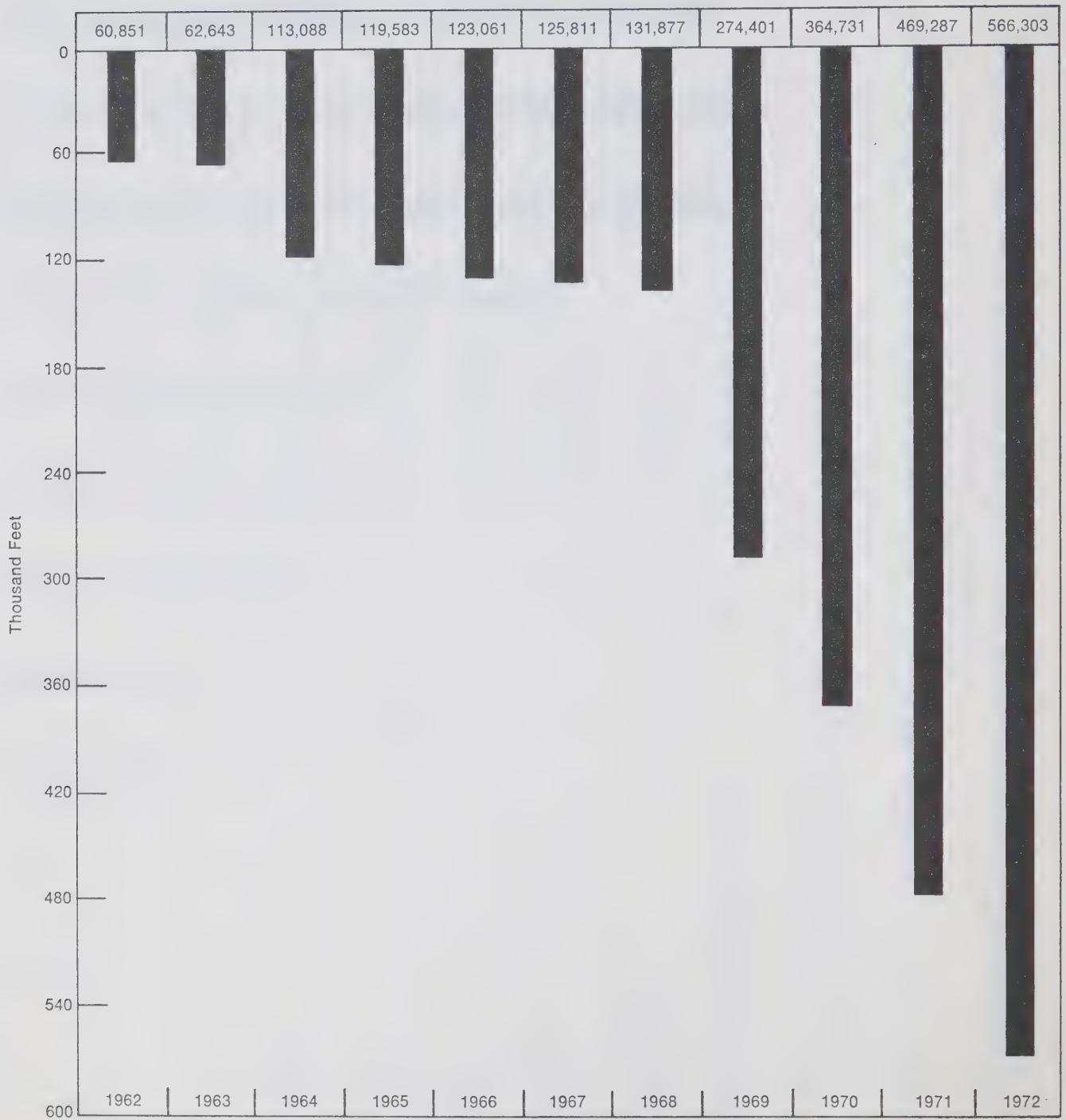


Fig. 2-6

Yukon Territory — Northwest Territories
Gross Revenue — Oil & Gas
from
Cash Bonus Bids, Fees, Forfeitures
Royalties, Rentals & Sale of Maps

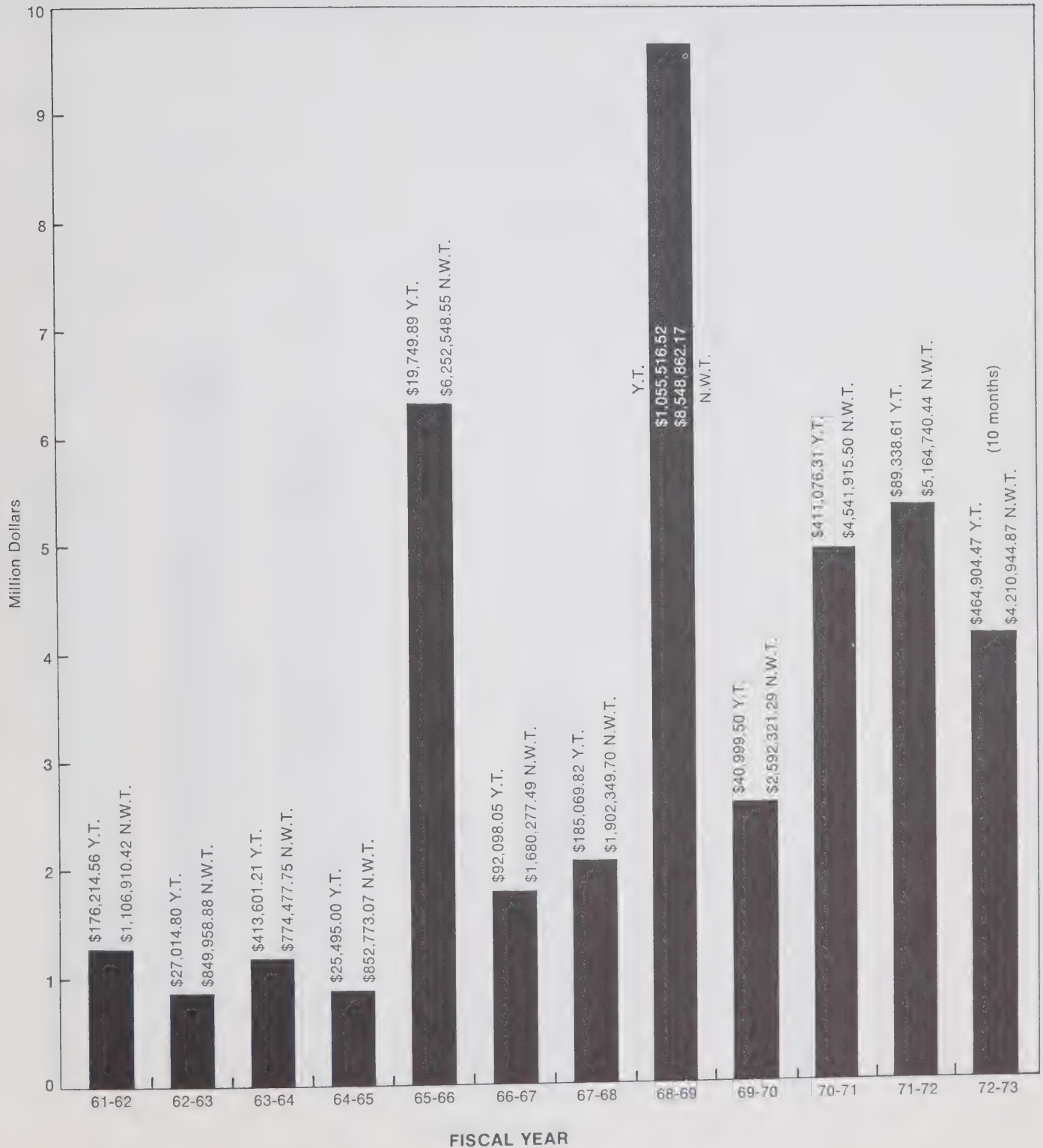


Fig. 2-7

Yukon Territory — Northwest Territories
Gross Revenue — Oil & Gas
from
Cash Bonus Bids, Fees, Forfeitures
Royalties, Rentals & Sale of Maps

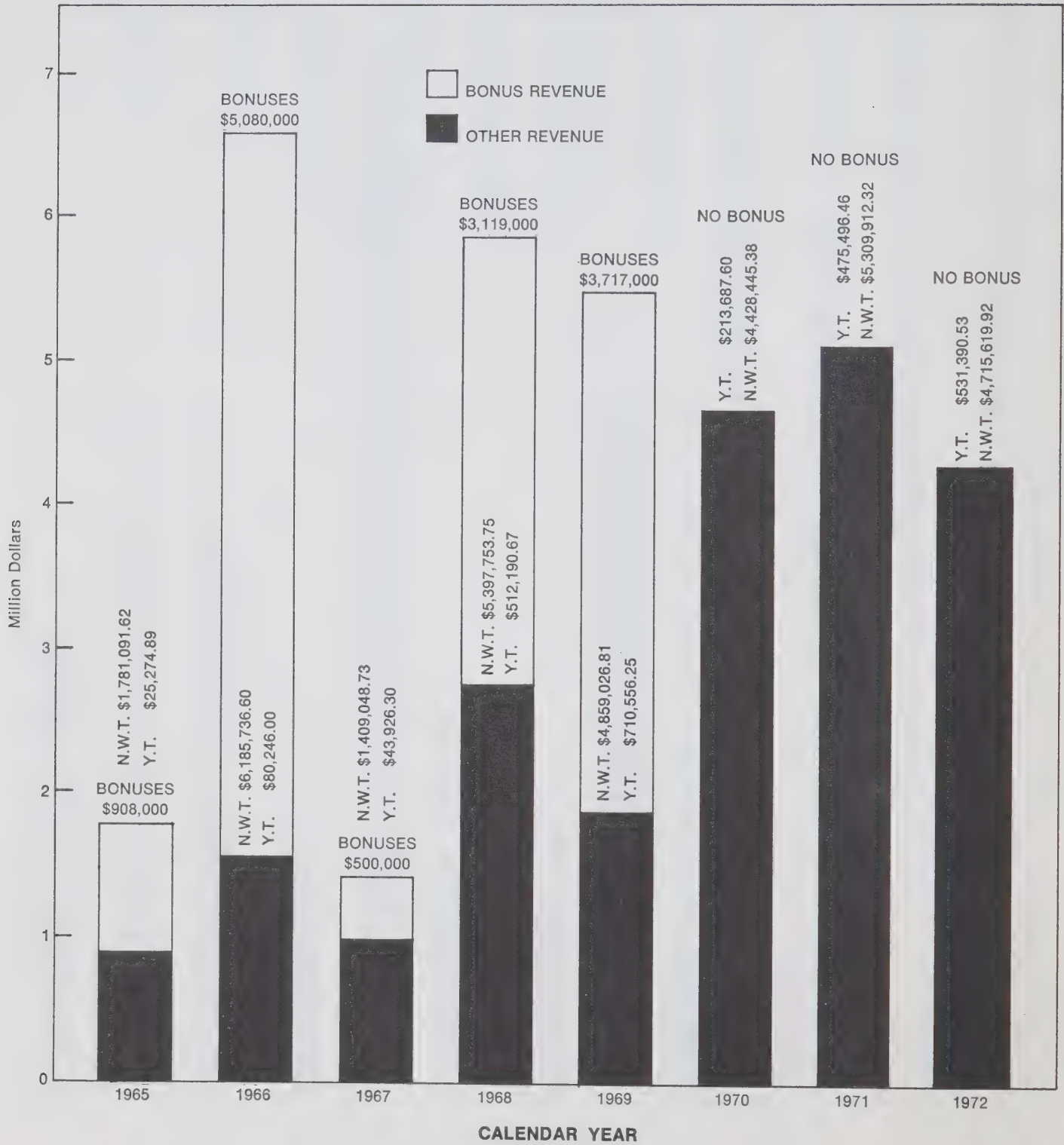


Fig. 2-8

Value of Work Bonus Tenders — Oil & Gas

Yukon Territory and Northwest Territories

NOTE: Cumulative Value End of Dec. 1969

\$58,896,608.91

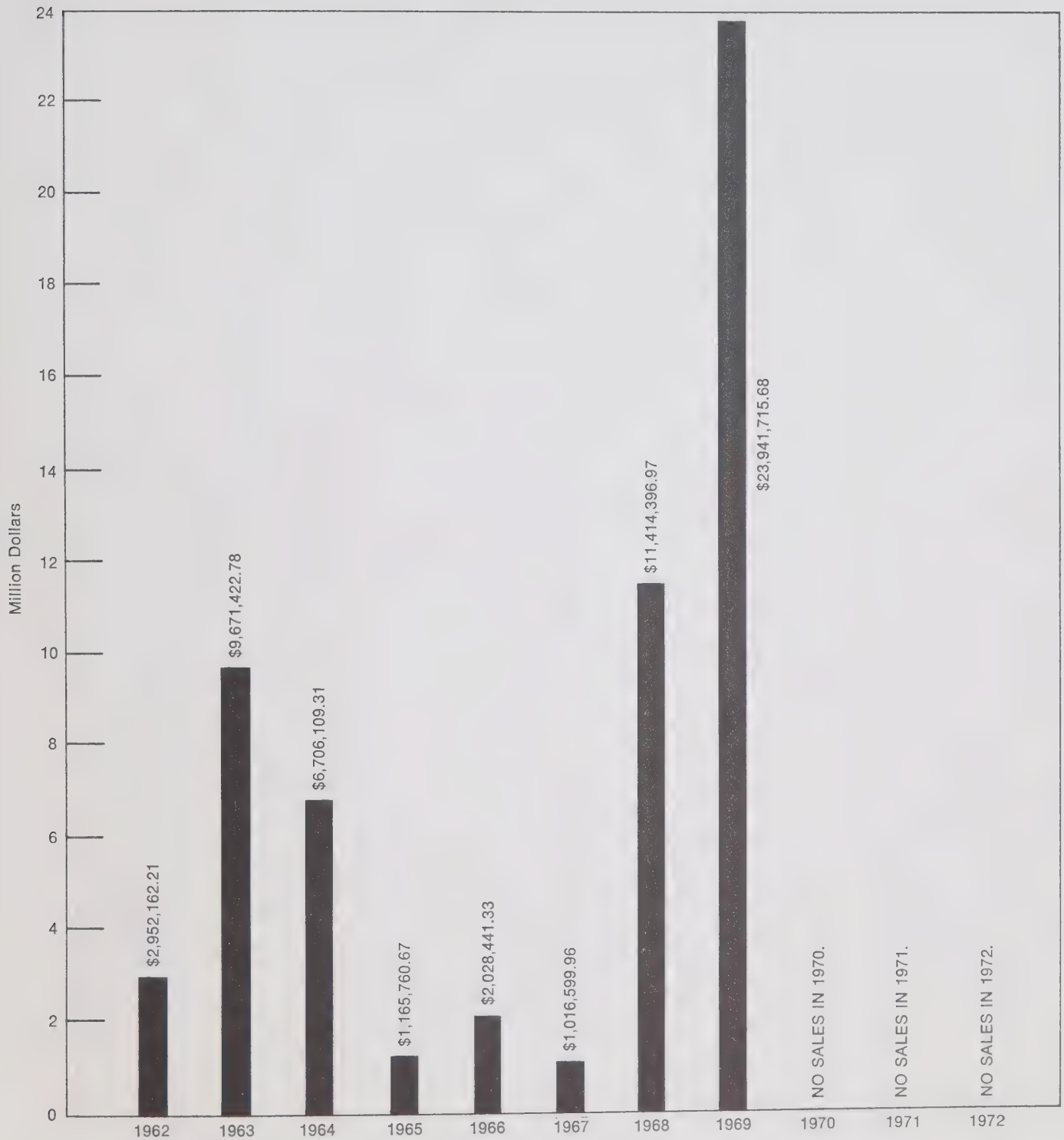


Fig. 2-9

North of 60

Mines and Minerals



Index

Mines and Minerals North of 60

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Revised January, 1974

Mines and Minerals North of 60°

3-1.1 General

The economic mineral resources of Canada North of 60 are taking the form of large deposits of lead-zinc, asbestos and iron which have barely been touched. The Federal Government, however, is encouraging private enterprise to move into the Yukon and Northwest Territories not only to explore for new deposits but to develop the present known mineral deposits.

For example, the known iron ore reserves are measured in the billions of tons; lead-zinc reserves are already well over 100,000,000 tons and copper and asbestos reserves are in the millions of tons.

The potential minerals awaiting discovery are equally impressive, for within the Northwest Territories there are 710,000 square miles of Precambrian rock and 100,000 square miles of Paleozoic rock that are favourable for minerals and over 200,000 square miles in the Yukon Territory which contain proven mineral districts.

The value of mineral production in the Yukon and the Northwest Territories has increased from \$33,897,819 in 1964 to nearly \$226,567,000 in 1972 (See Fig. 3-1 and Table 3-1).*

Five staking rushes have taken place since 1964. The first resulted from the discovery of the major lead-zinc deposits in the Pine Point area (1965-66), south of Great Slave Lake. The second (in 1966) resulted from a find of extensive lead-zinc mineralization in the Ross River area, 200 miles northeast of Whitehorse, Yukon Territory, where the staking soon grew into a rush to obtain ground. This find resulted in a major open-it, lead-zinc mine owned by Anvil Mining Corporation Limited, which commenced production in 1969, and is currently producing at a rate of 8,300 tons per day.

History completed a full circle in 1966 when mineral hunters (in the third rush) converged on the Coppermine River area of the Northwest Territories and in the ensuing months filed a total of 40,000 claims, the largest staking rush in Canada's history. This area, on the shores of the Arctic Ocean, first attracted attention nearly 200 years ago when in 1776 the Hudson's Bay Company sent Samuel Hearne to the region to search for reported native copper occurrences.

The fourth staking rush occurred in the Artillery Lake region during 1968-69, east of Great Slave Lake. Magnetic airborne anomalies indicated the possibility of a geological structure in which sulphide mineralization containing nickel was present. This development attracted a large number of exploration companies. Meanwhile, a fifth staking rush in 1969 developed as a result of finding a porphyry type copper molybdenum deposit in the Dawson range area of the Yukon.

The number of claims staked in the Yukon and the Northwest Territories increased two-fold, from

5,800 in 1963 to 14,400 in 1972, and were significantly higher during the years of the staking rushes (See Fig. 3-2). Current exploration expenditures north of 60 are in excess of \$12,000,000 annually.

3-2.1 Government Assistance and Services

The administration of mineral exploration and development North of 60, and the implementation of government legislation affecting them is the responsibility of the Oil and Minerals Division, Northern Natural Resources and Environment Branch of the Department of Indian Affairs and Northern Development. The Federal Government offers a number of incentive programs designed to assist interested individuals and companies in the exploration and development of mineral resources North of 60.* These include:

- Northern Mineral Exploration Assistance Program
- Northern Roads Program
- Northern Resources Airports Program
- Prospector's Assistance Program

3-2.1.1 Development and Incentive Program Section

The Development and Incentive Program Section of the Northern Policy and Program Planning Branch develops operational plans and procedures to ensure that the various cost sharing programs available in the North are administered in an effective and efficient manner.

The Section also participates in the appraisal of proposed resource development projects and in the provision of infrastructure; that is, the permanent installations of facilities which are necessary to the mineral industry during the exploration and development stages, such as roads, airports, seaports, towns and cities.

3-2.1.2 Mining Section

a) Mining Lands Unit

For administration purposes the Yukon and the Northwest Territories are divided into seven mining districts (See Map 3-2). A Mining Recorder is in charge of each of the districts. The districts and the location of the Mining Recorders' offices are as follows:

	<i>District</i>	<i>Office</i>
Yukon Territory	Mayo	Mayo, Y.T.
	Dawson	Dawson, Y.T.
	Watson Lake	Watson Lake, Y.T.
	Whitehorse	Whitehorse, Y.T.
	Mackenzie	Yellowknife, N.W.T.
Northwest Territories	Nahanni	Yellowknife, N.W.T.
	Arctic and Hudson Bay	Ottawa, Ontario

In addition to his administrative responsibilities in the Mining District each Mining Recorder answers queries and distributes information on prospecting and mining topics.

Overall supervision of Recorders' Offices North of 60 is carried out by the Supervising Mining Recorder located at Whitehorse, Y.T. and by the Head, Mining Lands Unit, Ottawa. The principal

*Preliminary Figures

*See Incentive Programs

function of these officers is to ensure that uniformity is maintained in the mechanics of the administration of all the mining acts and regulations

b) Exploration and Geological Services Unit

The Exploration and Geological Service unit must provide all possible assistance to those engaged in the discovery, development and use of mineral resources in Northern Canada. This involves the compilation of geological, geophysical and geochemical data, the collection and dissemination of information on mineral deposits, the support of scientific studies in the geosciences, special studies in areas of economic interest, and public education on matters related to the mineral industry.

The service also advises the Branch, Department and Commissioners of the Territories in matters pertaining to mining exploration in the Territories, assistance programs, road, airstrip and railway construction, economic studies and areas selected for national park development.

The regulatory work of the Service is confined to the review of geoscientific data submitted for assessment work credit. The duties of the Service are not defined by any statute.

The Service collaborates with the Geological Survey of Canada to ensure that there is no overlap in geoscientific services to the public. In the North the geology of oil and gas is not handled by the Exploration and Geological Service Unit.

c) Engineering and Inspection Services Unit

The Inspection Services Unit of the Mining Section is responsible for safety inspections of all operating mines. It is also responsible for claim inspection to ensure adherence to the provisions of existing regulations and for the monitoring of the mining atmosphere to ensure healthy working conditions.

The Unit is responsible for the operation of the Mine Rescue Stations in the Yukon and the Northwest Territories and for the training of mine personnel in the use of mine rescue equipment and first aid.

The Mine Rescue Stations in the Yukon are equipped with 41 Draeger B-174 four-hour oxygen breathing apparatus.

The Mine Rescue Stations in the N.W.T. have 48 Draeger four-hour breathing apparatus.

3-3.1 Mining Regulations

The administration of mineral exploration and development legislation is the responsibility of the Mining Section of the Northern Natural Resources and Environment Branch. The following acts and regulations apply:

- Canada Mining Regulations
- Yukon Quartz Mining Act
- Yukon Placer Mining Act
- Territorial Dredging Regulations
- Territorial Coal Regulations
- Mining Safety Ordinances and Rules
- Yukon Blasting Ordinances
- Explosives Use Ordinance, Northwest Territories

The above-named acts and regulations have three basic objectives:

- a) to provide an administrative system under which exploration and development of minerals can take place in an efficient and orderly manner.
- b) to establish an atmosphere which will encourage both individuals and companies to work in the Yukon and the Northwest Territories.
- c) to ensure that a reasonable share of the returns from mineral production is retained in Canada for the benefit of the people, the Territories and the nation as a whole.
- d) to ensure the safety of mines and protection of the environment.

3-3.1.1 Canada Mining Regulations

These regulations govern the disposition of Crown-owned minerals in the Northwest Territories — except for certain islands in Hudson Bay and James Bay.

In order to prospect for minerals, stake out or record a mineral claim, the individual or mining company is required to hold a valid prospector's license, issued by the Mining Recorder for the Mining District concerned, or from the Chief, Oil and Mineral Division, Northern Natural Resources and Environment Branch, Department of Indian Affairs and Northern Development, Ottawa.

Claims are marked by four posts with boundaries not greater than 1,500 feet. These boundaries must run as near as possible to astral North, South, East and West. The total area of each claim is not to exceed 51.65 acres.

Work to the value of \$100.00 must be done annually to hold a claim in good standing, and application for a lease must be made within 30 days after the expiration of the tenth year. The Mining Recorder and his staff in each Mining District are responsible for the proper maintenance of all files and books of record, as well as a claim map system.

Information regarding prospecting and mining is disseminated by all media of communication, by the Northern Natural Resources and Environment Branch in Ottawa, as well as the Mining Recorders. When necessary, interpretations, directives and instructions are prepared at the Northern Natural Resources and Environment Branch headquarters.

The granting of prospecting permits is a function of headquarters. This program was adopted to encourage the development of remote areas.

3-3.1.2 Yukon Quartz Mining Act

The provisions of this Act govern Crown-owned minerals in the Yukon Territory. They are similar to those of the Canada Mining Regulations, except that a prospector's license is not required, the two-post staking method is employed, claim boundaries may run in any direction and a lease is not mandatory after ten years.

3-3.1.3 Yukon Placer Mining Act

This Act is applicable to placer mining locations in the Yukon Territory. Claims are rectangular in shape and shall not exceed 500 feet in length along the

base line of a stream which is marked by two posts on a line parallel to the stream. The side boundaries are lines parallel to the base line and 1,000 feet distant. Work to a value of \$200.00 must be completed annually to keep the claim in good standing.

Royalty is collectable on the basis of 1½ % of the value of gold shipped from the Yukon Territory (value \$15.00 per ounce for this purpose).

Files, books of record and a claim map system are maintained by the Mining Recorder in each Mining District. Interpretations, directives and instructions are prepared and forwarded by the Northern Natural Resources and Environment Branch headquarters in Ottawa when necessary.

3-3.1.4 Territorial Dredging Regulations

These regulations are applicable to both the Yukon and the Northwest Territories. The 15-year lease system is used on a mileage basis on rivers up to a maximum of 10 miles. A minimum of 20,000 cubic yards must be dredged annually subsequent to the third year of lease. A royalty is payable to the Federal Government on production.

The first year's rental amounts to \$100.00 per mile, and subsequent years, \$10.00 per mile.

3-3.1.5 Territorial Coal Regulations

These regulations are applicable to both the Yukon and the Northwest Territories. Rights may be secured either by permit for small users or by lease for major operations.

The location must be as rectangular in shape as possible and the length must not exceed four times the width.

A royalty of 10¢ per ton of coal produced under lease is payable to the Federal Government.

Exploratory permits, having a life span of three years and covering one-quarter of the area of a claim map, may also be secured.

3-3.1.6 Mine Safety Ordinances and Rules

These ordinances and rules apply to both the Yukon and the Northwest Territories. Safety inspections are made of all mines to ensure compliance with the appropriate ordinances and rules. The inspections are carried out by the Inspection Services Unit of the Department.

In the Yukon Territory inspectors are also responsible for inspection of industrial installations and operations.

3-3.1.7 Yukon Blasting Ordinance

Under these regulations underground blasting operations are inspected and the storage and handling of explosives are kept under scrutiny. Candidates for blasting permits are interviewed and examined. Officers of the Inspection Services Unit of the Department carry out the inspections.

3-3.1.8 Explosives Use Ordinance Northwest Territories

This Ordinance governs the use and storage of explosives on all service projects. Candidates for blasting permits are interviewed and examined.

Officers of the Inspection Services Unit of the Department carry out the inspections.

3-4.1 North of 60 — The Yukon Territory

The memory of the Klondike Gold Rush of 1896, the most frenzied and spectacular gold rush ever seen, lives on in the Yukon, and in the hearts of adventurers the world over.

Today, the old fever is returning to the Territory as mineral hunters spread deeper into the northern regions looking for the same kind of strike the early prospectors found in the famous Bonanza Creek discovery. By 1966, when placer mining operations in the area finally ceased, the Klondike had produced well in excess of \$200,000,000 in gold.

The development of the Yukon mining industry has been sporadic until recent years. After the Klondike, only minor placer deposits were discovered in the Territory. Little attention was given to lode deposits. The first recorded lode discovery in the now famous Mayo area was made by H. W. McWhorter in 1906 — a silver-lead vein outcropping in Galena Creek near the present town of Elsa. Some production commenced in 1912. Further prospecting was carried out, and in 1919 another important discovery was made on Keno Hill.

Mining by Keno Hill Limited began in 1920, followed by Treadwell Yukon Company in 1923. Operations were suspended in 1942 and revived again in 1948 with the formation of United Keno Hill Mines Limited, which has operated several mines in the area during the intervening years. Until recently, United Keno Hill was Canada's largest single producer of silver concentrates.

Activities in the four mining districts of the Yukon Territory:

3-4.1.1 Mayo District

Producing Mines

United Keno Hill Mines Ltd.

Location	26 miles northeast Mayo
Product	silver, lead, zinc, cadmium concentrates
Rate of production	220 tons daily (1972)
Grade	31.8 ozs. per ton silver 4.48% lead 3.83% zinc
Reserves	86,470 tons
Employees	265

Development and Exploration

Recent exploration activity has centred around silver, lead, zinc, iron, copper and tungsten.

Among the major work being done in the district, Atlas Explorations Ltd. has been actively exploring its 184 claims covering four silver-lead-zinc prospects in the South McQueston Valley within 29 miles of United Keno Hill's Elsa Mine.

Crest Explorations Ltd. has outlined large reserves of iron ore on its 612 mineral claims located east of the Snake River, 150 miles northeast of Mayo. The claims cover a massive high grade hematite occurrence.

Amax Exploration Inc., a wholly owned subsidiary of American Metal Climax Inc. has carried out a geological mapping and diamond drilling program on a promising tungsten property on the Yukon — N.W.T. border at MacMillan Pass. Claims have been recently surveyed and the Company intends to obtain mineral leases.

Diamond drilling in 1968 and 1971 totalled 12,000 feet. The 1972 work consisted of 20,000 feet of diamond drilling and detailed core logging. Amax recently announced that more than 30 million tons of tungsten bearing rocks have been outlined on this property with an indicated average grade of 0.9 percent tungsten trioxide. Underground development, sampling and drilling is planned for 1973.

Exploration in the Mayo Mining District has centered on Keno Hill and surrounding districts where United Keno Hill Mines has carried out surface exploration both on property and outside property. This company has developed a system of exploration from surface using an overburden drill which samples overburden and the underlying bedrock and it has been used with great success on their claims on Galena Hill. The new Husky vein systems were originally found using this method.

Other Companies continue to explore for new mineral deposits in the area and one of the latest is Bullion Mountain Mining Company which has discoveries of silver, lead-zinc mineralization on the Clark claims north of Keno Hill and has carried out a geophysical survey, trenching and diamond drilling to outline grade and tonnage of the deposits.

Atlas Exploration and associated companies continue to explore their properties in the Hess Mountains as a result of lead-zinc mineralization found during geochemical surveys in 1969, 1970 and 1971.

Other companies which carried out prospecting programs in the district are Hudson Bay Exploration and Development Company Limited, Lacanex Mining Co. Ltd., and Canex Aerial Exploration Limited.

3-4.1.2 Dawson District

Producing Mines

Cassiar Asbestos Corporation Ltd.

Location	50 miles northeast of Dawson
Product	asbestos fibre
Rate of production	4,635 tons daily (1972)
Grade	5.37% of 1/16" - 1-1/8" fibre
Reserves	18,750,000 tons
Employees	223

There are 20-25 small placer operators working creeks in the district.

Development and Exploration

Gold placers, antimony, gold, silver and lead prospects are present in the Dawson district. Connaught Mines Limited owns a silver-lead property containing a number of massive galena veins, two of which were high graded in a limited way (25 tons) in 1966.

3-4.1.3 Watson Lake District

Producing Mines

No mineral production is taking place in the district at the present time.

Development and Exploration

Canex Placer Ltd. staked the 450 claims of their Nahanni lead-zinc prospect during the 1972 field season. The company did follow-up prospecting near Summit Lake on the basis of 1971 reconnaissance geochemical work. Galena and sphalerite were discovered in Paleozoic sediments in July. A bulldozer was brought in and several trenches were cut in a mineralized zone. The belt staked by Canex is one to three miles wide and some 25 miles long, crossing the irregular Yukon-N.W.T. border.

Word of the Canex activity stimulated a staking rush in the fall and early winter, such that by year's end some 5,000 additional claims were staked. This is the first big rush since the Casino activity in 1969.

The Asarco Exploration Co. of Canada holds a lead-zinc deposit at Quartz Lake, 40 miles northeast of Watson Lake. Diamond drilling has indicated 1 million tons containing 10% zinc, 5% lead and 1.8 ozs. of silver per ton.

Hudson Bay Mining and Smelting Co. Ltd. is carrying out an extensive surface and underground diamond drilling program, as well as mapping and geochemical surveys, on a lead-zinc prospect nearer the Yukon-N.W.T. border. The prospect was found in 1951 and by 1953 the exploration program was completed, with reserves of 7,000,000 tons grading 8% zinc, 8% lead and 2.7 ozs. silver per ton. The Hudson Bay Mining and Smelting Co. Ltd. also carried out a minimum drilling program on a copper tungsten property to the southeast of the main property.

Metallgesellschaft and Matt Berry Mines Limited carried out geological mapping, geophysical surveys and diamond drilling on a lead-zinc bearing formation east of Francis Lake.

Boswell River Mines Ltd., and Wolf Lake Joint Venture carried out mining exploration work in areas adjacent to the Alaska Highway, namely the Rancheria area and the Swift River area, on lead-zinc-silver properties.

Atlas Explorations Ltd. controls the Mt. Hundere prospects which are located 35 miles north of Watson Lake and contain high-grade lead-zinc mineralization. The work to date indicates a limited tonnage.

Atlas' Fyre Lake prospects, 86 miles southeast of Ross River, contain copper mineralization. The Sheldon prospects, covering seven claim groups in the Ross River area, have revealed lead-zinc mineralization, with varying amounts of silver-gold and copper.

In 1968 a joint venture agreement was made by Atlas with Mitsui Mining and Smelting Co. of Japan on the Sheldon project.

Mineralization indicating up to 10% zinc has been found by Norquest Joint Venture on a lead-zinc showing near mile 59 of the Watson Lake — Canada Tungsten road.

The Venture is formed by the Anaconda Company (Canada) Limited, Asbestos Corporation (Explorations) Limited, Bralorne Pioneer Mines Limited, Granby Mining Company Limited, New Jersey Zinc Company (Canada) Limited and Utah Construction and Mining Company.

3-4.1.4 Whitehorse District

Producing Mines

(a) Whitehorse Copper Mines Ltd.

Location	7 miles from Whitehorse
Product	copper concentrates
Rate of Production	2,400 tons daily (1972)
Grade	2.38% copper
Reserves	2,702,274 tons open pit grading 1% 3,000,000 tons underground, graded at 2%
Employees	127

(b) Anvil Mining Corp. Ltd.

Location	130 miles northeast of Whitehorse
Product	silver, lead, zinc
Rate of production	7,935 tons daily (1972)
Grade	4.9% lead, 6.8% zinc, 1 ounce silver per ton.
Reserves	59,940,000 tons of 11% combined lead-zinc
Employees	350

(c) Hudson — Yukon Mines Ltd.

Location	200 miles northwest of Whitehorse
Product	nickel, copper
Rate of production	356 tons daily
Grade	2.04% nickel, 1.42% copper
Reserves	737,600 tons (1971)
Employees	100

Development and Exploration

Lead-zinc exploration in the Vangorda Creek-Anvil Project areas continues to be important for mining exploration. Exploratory work carried out by Kerr Addison Mines Limited in the Vangorda Creek area from 1963 to the present uncovered a mineralized body, containing approximately 5,000,000 tons, grading 1.5 ounces silver and 9.15% combined lead-zinc, plus minimum copper and gold values, known as the Swin deposit. Kerr also controls Vangorda Mines Limited which has the Vangorda deposit of 9,400,000 tons of 3.2% lead, 4.9% zinc and 1.76 ozs. silver. Anvil Mining Corporation Limited continues to carry out on and off property exploration in the area and both Dynasty and Spartan Explorations are carrying out detailed exploration programs. A recent find by Casino Silver Mines Limited was a porphyry type copper-molybdenum prospect 190 miles northwest of Whitehorse, Yukon. Inferred reserves as of November, 1970 were 179,000,000 tons, averaging 0.383% copper and 0.053% molybdenite.

Major work on silver-lead-zinc prospects was undertaken; in the Rancheria area, Boswell River Mines found silver and lead through 1,600 feet of drilling and copper and zinc in adjacent properties. Further work is expected.

In the Dawson Range, several companies, among them Silver Standard Mines, Montana Mines Limited, Occidental Minerals Corp. and Mitsubishi Metal Mining Company, carried out detailed exploration programs in search of copper-molybdenum deposits.

3-5.1 North of 60 — Northwest Territories

The mineral potential of the Northwest Territories was first discovered some 200 years ago, when the Hudson's Bay Company sent Samuel Hearne to the Coppermine area, on the Arctic coast, to search for reported native copper occurrences.

Hearne was not very impressed by what he saw on the rockstrewn plain of the Central Arctic, but since his trip in 1776 the area has continued to intrigue mineral hunters. In 1911-12 the first detailed examination of the Coppermine area was carried out. Further interest was shown in 1930, 1944, 1952 and 1957. Finally, in 1966, the biggest staking rush in Canada's history got under way in the Coppermine region and today it is under intensive examination.

The first mineral production in the Northwest Territories took place on the shores of Great Bear Lake in 1932 with the famous Eldorado radium mine. This property assumed great importance during World War II when uranium was required for the manufacture of the atomic bomb.

Gold was discovered in the Yellowknife area in 1934 and in 1938 the Con Mine came into production. It was followed by four others. Most of these mines closed with the outbreak of World War II. However, activity was renewed and in 1948 the Con Mine was re-opened and Giant Yellowknife, the largest gold producer in the Northwest Territories came into production the same year, followed by Discovery in 1950.

Tundra — the first mine in the Barren Lands — commenced producing gold early in 1964. This operation, which subsequently closed down in 1967, proved the possibilities of operating in remote areas subject to severe climatic conditions.

Since 1964 the mineral economy of the Northwest Territories has moved forward rapidly. When the Pine Point lead-zinc mines opened in 1964 the value of mineral production in the Northwest Territories jumped from \$18.7 million to \$77 million, and is currently \$124 million.

Echo Bay Mines revived mining in the Great Bear Lake area when it developed a rich silver vein close to the old Eldorado mine. Close to the border with the Yukon Territory the first tungsten mine North of 60 commenced production in 1962. It has gone on to become the major producer of tungsten in North America.

With the completion of the Great Slave Lake Railway to Pine Point and Hay River, considerable exploration activity was generated in the Pine Point area.

Pyramid Mining Company, in October, 1965,

obtained a good ore intersection in its diamond drilling program, and when news of this was disclosed a staking rush followed. By mid-1966 some 30,000 mineral claims were recorded in this area.

Although many anomalies were drilled, only a few companies were successful in outlining ore.

During the summer and fall of 1966 the activity shifted from the lead-zinc deposits in the Pine Point area to copper in the Coppermine and surrounding areas.

Following the Coppermine rush, companies staked many claims in the area east of Artillery Lake. The attraction of this activity was nickel mineralization. By 1970 interest was centred on the Hackett River area where Cominco and Bathurst Norsemines Ltd. drilled a lead-zinc-copper-silver deposit.

Base metal and uranium deposits are the target of present exploration in the greenstone belt north of Yellowknife, Hackett River area, Little Cornwallis Island, Camsell River area, Mackenzie Mountains, and the Cumberland and Borden Peninsulas of Baffin Island.

Two new iron ore deposit areas were found on Melville Peninsula while exploration for base metals and uranium continued in mainland Keewatin.

3-5.1.1 Mackenzie District

Most of the mineral production of the Northwest Territories comes from the Mackenzie district. The value of mineral production from 1934 to 1967 totalled \$587,749,930. There are seven producing mines in the district, including four gold, two silver-copper, and one lead-zinc mine. Six are underground operations and one is open pit.

Producing Mines

(a) Con-Rycon Vol.

Location	1.5 miles north of Yellowknife
Product	gold
Rate of production	415 tons daily (1972)
Grade	0.576 ozs/tons
Reserves	10 years at present rate of production
Employees	209

(b) Giant Yellowknife Mines Ltd.

Location	1.5 miles north of Yellowknife
Product	gold
Rate of production	1,100 tons daily (1972)
Grade	0.50 ozs/ton
Reserves	745,000 tons
Employees	380

(c) Supercrest Mines Ltd.

Location	1.5 miles north of Yellowknife
Product	gold
Rate of production	168 tons daily
Grade	0.70 ozs/ton
Reserves	123,800 tons (1971)
Employees	operated by Giant Yellowknife Mines Ltd.

(d) Lolor Mines Ltd.

Location	1.5 miles north of Yellowknife
Product	gold
Rate of production	206 tons daily
Grade	0.66 ozs/ton
Reserves	133,100 tons (1971)
Employees	operated by Giant Yellowknife Mines Ltd.

(e) Pine Point Mines Ltd.

Location	south shore of Great Slave Lake
Product	lead, zinc concentrates
Rate of production	10,671 tons daily (1972)
Grade	2.6% lead, 6.5% zinc
Reserves	41.9 million tons with an average grade of 9.9% combined lead-zinc
Employees	524

High grade ore shipped to Consolidated Mining and Smelting Company smelters at Trail B.C. Lead-zinc concentrates shipped to Japan, the United States and India.

(f) Echo Bay Mines Ltd.

Location	Great Bear Lake
Product	silver, copper concentrates
Rate of production	112 tons daily (1972)
Grade	55 ozs. per ton silver
Reserves	2 years at present rate of production
Employees	128

Concentrates are shipped by barge, winter road and aircraft from the property to rail head at Hay River for trans-shipment to smelters.

(g) Terra Mining and Exploration Ltd.

Site:	40 miles south of Great Bear Lake
Rate:	76 tons daily (1972)
Tons milled:	22,727 tons
Grade:	41.4 ounces of silver per ton and 0.8% copper
Reserves:	Not available
Employees:	40

Development and Exploration

The Coppermine area of the Mackenzie district has been the scene of the most active exploration work in mining history beginning in 1966.

P.C.E. Explorations and Coppermine River Mines were the first of some 60 companies that moved into the area to explore the historic region. These two companies succeeded in outlining in excess of 4,000,000 tons of ore averaging 3.0% copper.

Most of the companies in the area undertook intensive programs, consisting of geological, geo-physical surveying and diamond drilling. Copper mineralization in the form of bornite and chalcocite is widespread. This exploration ceased in 1969, however, it is expected to be revived when economic conditions improve.

The search for copper subsequently spread to the neighbouring islands in the Arctic Archipelago. Prospecting permits were issued on Victoria Island

and, in addition, a number of claims were staked in the area. Bornite and chalcocite mineralization were reported.

Cominco undertook a detailed exploration program in conjunction with Bathurst Norsemine Explorations Ltd. in the Hackett River area on a silver-zinc-lead-copper showing. Reserves are estimated at 10,000,000 tons of 8% combined Pb-Zn and 9.0 oz. Ag/ton.

Giant Yellowknife conducted extensive exploration during 1971 and 1972 on nickel-copper showings in the Perry River area. High-grade discovery of nickel-copper float lead to this activity. Giant obtained seven prospecting permits and several other exploration companies are now active in the area.

In the Camsell River Area the presence of two producing silver mines, Echo Bay Mines Ltd. and Terra Mining Exploration Ltd., and two developing properties, Norex Resources Ltd. and Federated Mining Corporation Ltd., spurred the search for silver.

Federated Mining Corp. Ltd. mined some silver in April-May 1971, producing 57,500 oz. Ag and 1,840 lbs. Bi from 600 tons of ore milled. The Camsell River silver mine was scheduled to commence production at a rate of 100 tons per day by December, 1971. Norex Resources Ltd. has reserves, so far indicated, at only 15,000 tons of 146 oz. Ag per ton. Norex Resources and Terra Mining and Exploration have signed an agreement whereby Terra takes over exploration of the Norex property. To establish tonnage and grade to approach the accurate mill size required would call for a major underground exploration development and mining program.

Other companies conducting surveys in the area are Vestor Explorations Ltd., Tobe Mines Ltd. and Jason Explorers Ltd.

An interesting silver showing was discovered between Lake La Loche and Great Slave Lake by a prospecting syndicate headed by F. Diamion of Hay River. Silver values were obtained in the McDonald Fault System proving to be one of the first silver showings reported from rock of the Churchill Province south of Great Slave Lake.

Interest in uranium prospects suffered a sharp decline in 1971 but several companies continued work on known showings, especially in the East Arm of Great Slave Lake. The most promising of the 1970 discoveries was on Simpson Island, with 4,794 feet of drilling completed by Vestor Explorations Ltd. In the Reliance Area a prospecting and mapping program resulted in the discovery of a new mineralized zone, with samples grading up to 6.7% U_3O_8 . In the Nonacho Lake Area, Imperial Oil Enterprises Ltd., Nissho-Iwai Canada Ltd., G.V. Lloyd Ltd. and Getty Mines Ltd. conducted programs in search of the prized commodity.

Nickel prospects are being examined by Northgate Exploration Ltd. and Arjay Kirker Resources Ltd. in the Darnley Bay Area, and by Zig Mines Ltd. in the East Arm Area.

Other mineral prospects being explored are a

possible horizon of bentonite, twelve miles north of Inuvik, by Trans-Canada Resources Ltd., and an occurrence of fluorite in the Schist Lake area, discovered by Great Plains Development Co. of Canada Ltd.

3-5.1.2 Nahanni District

Producing Mines

Canada Tungsten Mining Corporation	
Location	125 miles north of Watson Lake
Product	tungsten-copper concentrates
Rate of production	466 tons daily (1972)
Grade	1.19% WO_3
Reserves	443,700 tons of 1.36% WO_3 (1971)
Employees	84

Development and Exploration

Copper deposits in the Redstone River Valley area have been under examination since the early 1960s, with Redstone Mines Limited, which holds 591 claims on the site, undertaking 22,000 feet of diamond drilling and some geological survey work.

Underground exploratory work on a silver-lead showing on Prairie Creek, about 125 miles due east of the Canada Tungsten mine, was undertaken by Cadillac Exploration Limited in 1968.

3-5.1.3 Arctic and Hudson Bay District

Producing Mines

There is no producing mine in the Arctic and Hudson Bay district at the present time. North Rankin Nickel Mines operated a copper-nickel mine on the west coast of Hudson Bay from May 1957 to September 1962 until all known ore was exhausted. North Rankin produced 21.3 million pounds of nickel and 5.8 million pounds of copper.

Development and Exploration

One of the world's largest high grade iron ore discoveries was made at Mary River, in the north-western area of Baffin Island. Exploratory work in 1963-64 confirmed the body to contain approximately 130,000,000 tons of iron ore grading 68.2% iron.

Baffinland Iron Mines Limited was formed by British Ungava Explorations Limited to take over development of this deposit and feasibility studies commenced in 1965. These studies on marketing, shipping and other aspects are continuing. Texas Gulf Inc. has a lead-zinc property situated on Strathcona Sound, northwest Baffin Island.

Some 90,000 feet of diamond drilling were completed by the end of 1968 and underground exploration was carried out in 1969. Reserves on the property have been estimated at 12,000,000 tons of 1% Pb, 8.8% Zn and 1.3 oz. Ag per ton.

Mineral Resources International of Calgary is sponsoring a production feasibility study as part of an agreement with Texas Gulf Inc. Three surface diamond drills, working at the west end of the zone carried out 10,000 feet of diamond drilling in the fall of 1972.

Cominco Ltd. conducted an extensive program consisting of prospecting geological mapping, geophysics and geochemistry over the northern extension of the Boothia Arch around Arvik Mines Ltd. lead-zinc development.

They hold 12 prospecting permits covering parts of Cornwallis Island, the Grinnella Peninsula on Devon Island and several smaller islands in this region.

Underground exploration and development was carried out on the Cominco-Bankeno lead-zinc property on Little Cornwallis Island during the winter of 1972-73. Reserves on the property have been estimated at 20,000,000 tons of 20% combined Pb-Zn.

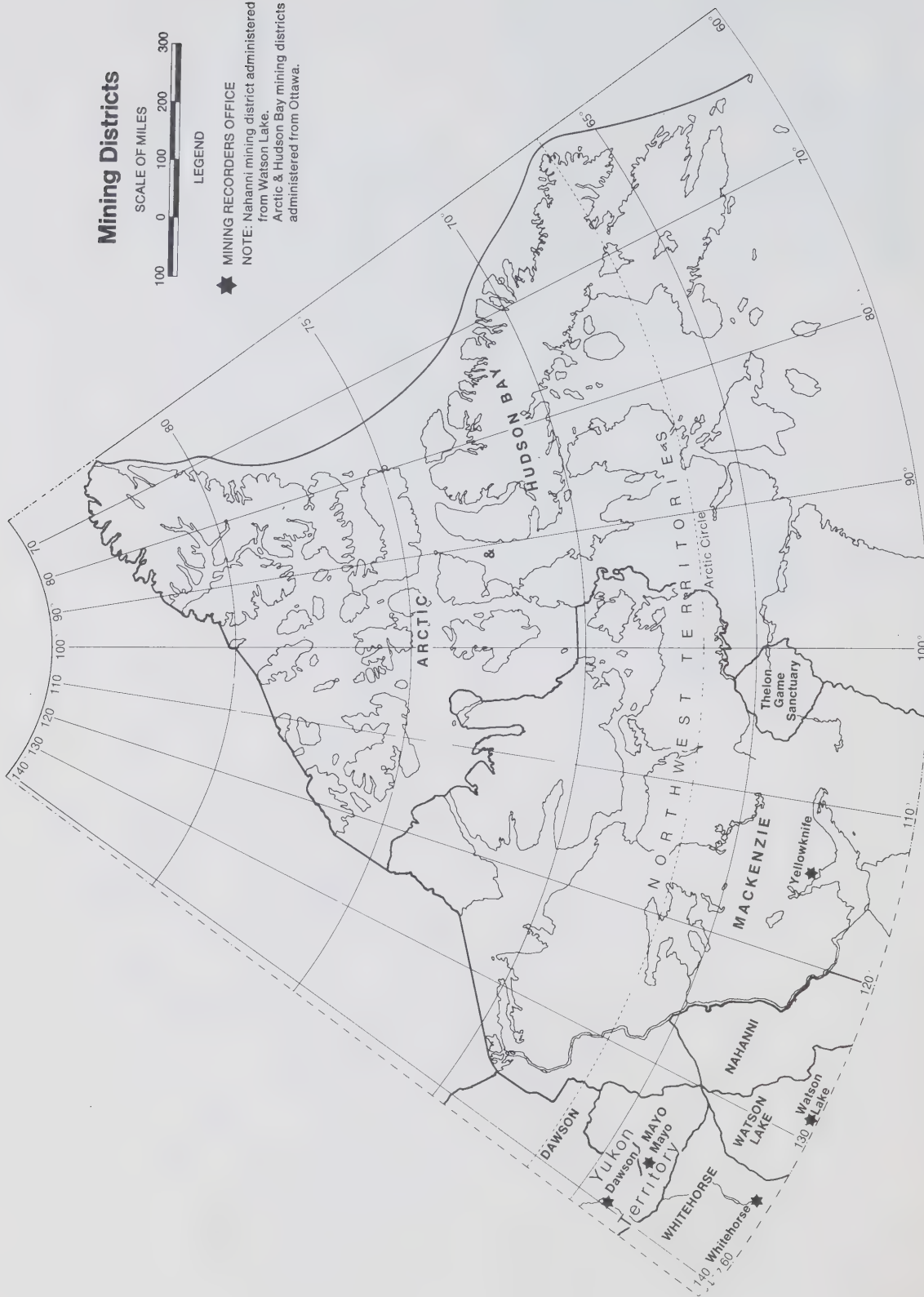
- In Melville Peninsula, Borealis Exploration Ltd. has estimated its present reserves at 3,700,000,000 tons of 35% iron ore.

Copper deposits are being explored by Aquitaine Co. of Canada Ltd. in the Tetyek River area, Wager Bay and Baffin Island; Canadian Superior Exploration Ltd. in Carr Lake Area; Penarroya Canada Ltd. in Ferguson River-Tavani Area and Five Star Petroleum and Mines Ltd. was active in the Rankin Inlet Area.

Finally, in the Baker Lake area, Pan Ocean Oil Corp. is continuing its investigation of uranium mineralization; it is conducting high-sensitivity magnetometer, ground geochemical and geological mapping surveys.



Map 3-1



Map 3-2

Value of Production

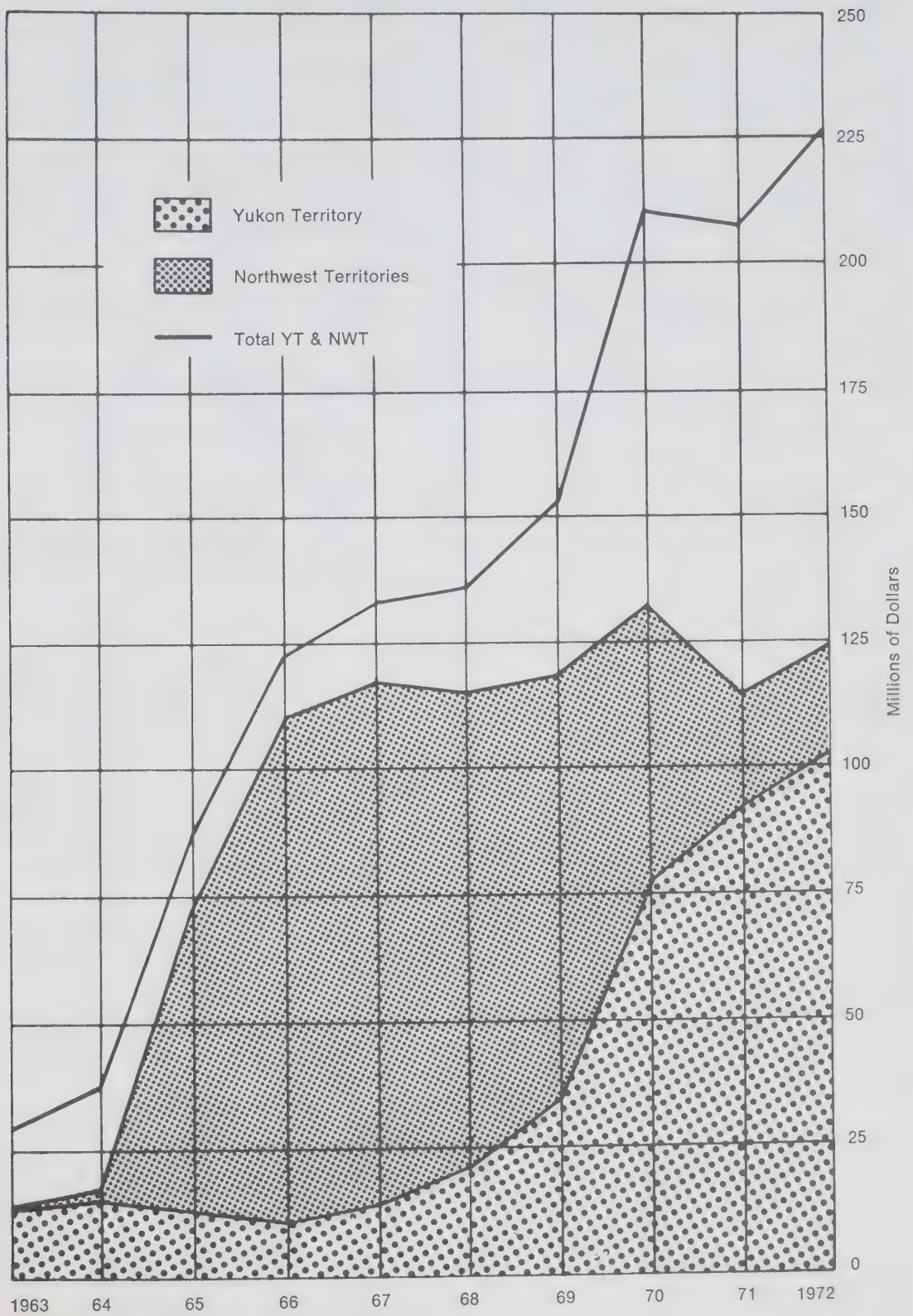


Fig. 3-1

Mineral Claims Recorded

Northwest Territories & Yukon Territory

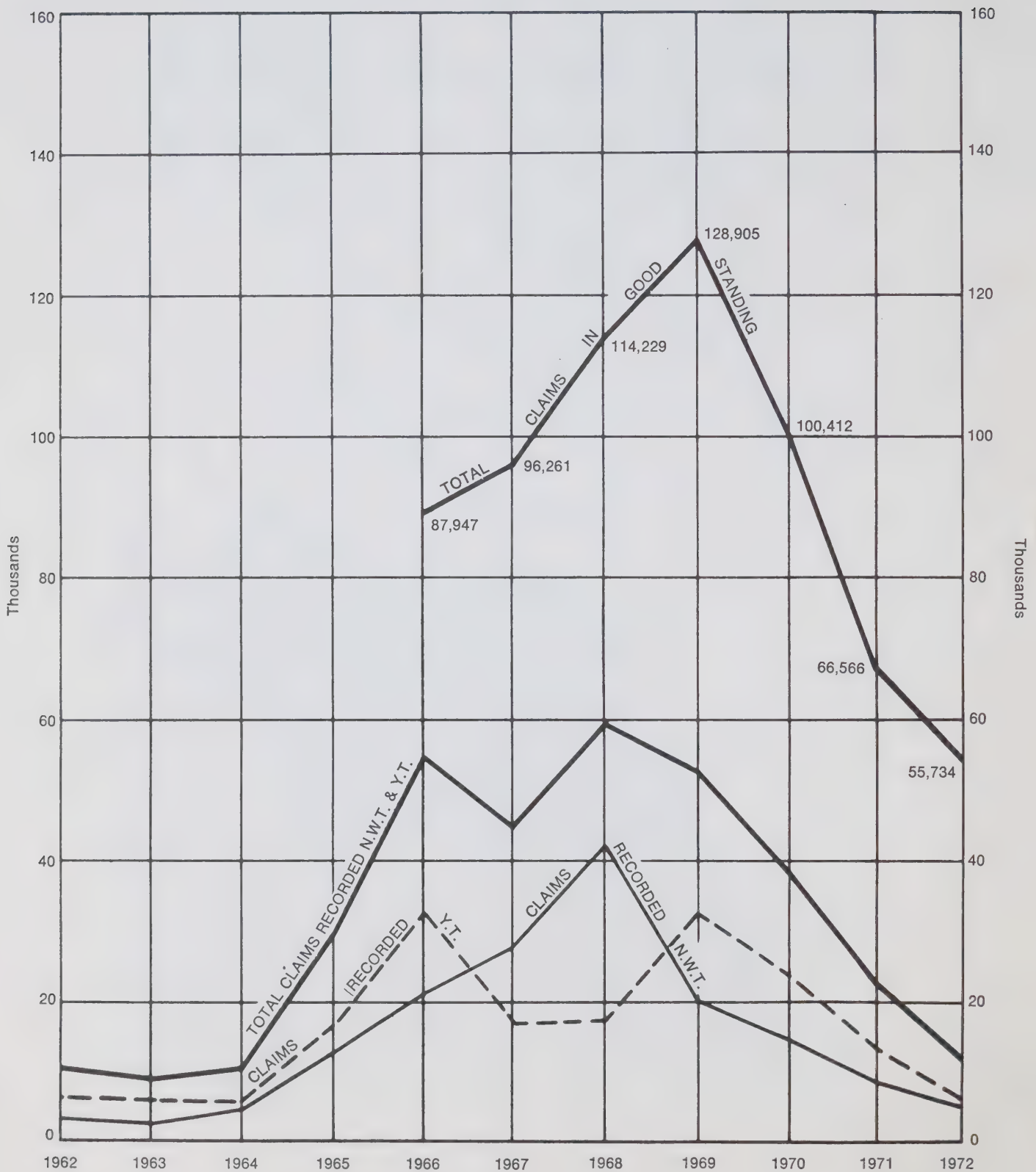


Fig. 3-2

Table 3-1
Mineral Production Chart — 1963 to 1972

Northwest Territories

Mineral	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972(a)	Cumulative Totals(b)
Gold ounces	14,609,250 387,000	15,586,182 412,879	17,071,580 452,479	15,990,133 424,029	14,356,476 380,304	13,285,459 352,306	12,381,240 328,502	12,168,776 332,844	10,897,934 308,339	10,537,000 288,000	312,757,163
Silver ounces	107,216 77,468	91,312 65,223	1,490,754 1,064,824	2,325,407 1,662,192	3,429,755 1,980,228	8,677,365 3,751,563	3,910,888 2,026,367	5,114,587 2,764,642	4,574,616 2,932,446	7,303,000 4,399,000	38,768,844
Copper pounds	10,281 32,638	— —	354,342 942,400	672,065 1,496,805	538,077 1,131,126	833,169 1,732,160	643,761 1,251,723	766,578 1,320,502	727,595 1,378,021	609,000 1,204,000	6,570,536
Nickel pounds	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	12,850,205
Lead pounds	— —	823,279 6,125,588	25,677,695 165,662,547	31,472,562 210,659,720	35,665,535 254,753,820	33,636,984 250,275,180	32,299,014 212,913,740	37,842,405 239,206,099	22,629,795 167,628,110	25,606,000 166,000,000	245,653,269
Zinc pounds	— —	1,111,016 7,840,620	28,596,474 189,380,626	57,128,344 378,333,400	60,852,900 419,964,800	57,504,129 407,830,700	68,275,481 448,296,000	76,004,563 477,115,900	75,056,384 448,633,500	80,094,000 420,000,000	504,623,291
Pitchblende(d) pounds	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	79,477,897
Cadmium pounds	— —	— —	516,635 185,840	2,769,372 1,073,400	2,551,920 911,400	774,060 271,600	675,136 191,800	737,632 207,200	301,476 155,400	— —	8,326,231
Bismuth pounds	— —	— —	— —	— —	— —	— —	— —	3,072 490	41,149 7,578	— —	44,221
Tungsten pounds	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —	—
TOTAL	14,726,747	17,611,789	73,707,480	110,357,883	117,394,663	114,711,166	118,185,520	132,637,613	114,228,949	124,149,000	1,209,071,657

Yukon Territory											
Gold ounces	2,084,215 55,211	2,183,611 57,844	1,698,975 45,031	1,639,103 43,466	675,725 17,900	911,338 24,167	1,118,715 29,682	653,034 17,862	511,534 14,473	145,000 4,000	(c) 268,429,370
Silver ounces	8,450,755 6,106,037	7,894,196 5,638,712	6,462,753 4,615,995	5,868,217 4,194,580	6,701,756 2,077,987	4,806,384 2,077,987	5,182,166 2,685,060	7,845,312 4,240,709	8,966,417 5,747,703	9,330,000 5,620,000	164,378,659
Lead pounds	1,867,647 16,978,607	2,744,235 20,418,415	2,766,953 17,851,309	2,386,684 15,975,125	2,141,959 15,299,709	970,629 7,221,940	4,256,183 28,056,581	20,830,196 131,670,010	29,340,379 217,338,142	34,848,000 225,921,000	145,571,577
Copper pounds	— —	— —	— —	— —	3,409,779 7,167,919	5,097,157 10,597,000	7,645,623 14,866,077	9,148,995 15,760,000	2,709,696 5,132,000	— —	31,113,033
Coal tons	123,675 8,231	98,150 7,229	85,626 8,801	46,390 5,670	15,791 1,912	— —	6,039	10,308	21,026	18,435	2,567,132
Zinc pounds	1,514,520 11,850,706	1,855,512 13,094,653	2,000,396 13,247,853	1,729,027 11,450,510	1,373,151 9,476,545	748,206 5,306,429	5,035,385 33,062,280	24,845,216 155,964,948	39,003,342 233,134,144	43,861,000 230,000,000	147,230,567
Cadmium pounds	326,124 135,865	428,399 132,222	386,192 139,918	306,336 118,735	265,997 94,999	147,716 51,830	239,965 68,172	261,528 73,463	114,654 59,100	33,000 13,000	6,248,758
Asbestos tons	— —	— —	— —	— —	406,371 2,260	8,684,125 63,592	11,924,526 87,437	13,927,652 105,638	12,374,380 91,969	14,200,000 104,000	61,517,054
TOTAL	14,366,936	15,204,103	13,400,535	11,975,757	14,990,529	21,365,555	35,402,563	77,511,933	93,020,402	102,418,000	827,056,150

(a) Preliminary Figures

(b) Cumulative Totals — 1932 to December 31, 1972
(Figures for tungsten not available)

(c) Cumulative Totals — 1886 to December 31, 1972

(d) Figures for years 1932, 1943, to 1953
not available.

North of 60 Water



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Water North of 60

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Revised January, 1974

Water North of 60

4-1.1 General

Water is becoming recognized as the most important renewable resource North of 60. The development of the Yukon and Northwest Territories will continue to depend on water for transportation and hydro-electric power generation. In addition, attention is now being focussed on the need to maintain the current high quality of northern waters in the face of increasing commercial activity in the North.

As the region enters a period of sustained industrial expansion, there will be an increasing demand for water needed in resource processing and other industrial uses, and for use by an expanding population. Also, the obligation of Government to protect the right to water of the indigenous population for fishing and trapping of fur-bearing animals is recognized, as well as the need to conserve water for recreation purposes.

There are two dominant features of the northern water regime that influence the supply of water available for use in the Yukon and Northwest Territories. The first is that much of the flow in the two main drainage basins, the Mackenzie and Yukon systems, originates south of the 60th. parallel. The second is that the level of precipitation in the North is generally very low. Although maps reveal countless lakes in the North, their existence depends on low evaporation and the fact that drainage is inhibited by underlying permafrost and the nature of the Canadian Shield.

It has been estimated that up to 50% of Canada's fresh water resources are located north of the 60th. parallel. Usable water, however, in the form of continuous flows, likely comprises only half of this amount, with the remainder held in dead storage.

4-2.1 Federal Government Services

4-2.1.1 Department of Indian Affairs and Northern Development

The Water Management Section of the Northern Natural Resources and Environment Branch is responsible for the management of water use, including pollution control, in the Yukon and the Northwest Territories.

The Section is responsible for the orderly development and utilization of water in the expanding economies of the Yukon and Northwest Territories, which involves:

- a) allocation of rights to the use of water in the best interest of the region and of the nation as a whole, through a system of water licencing;
- b) comprehensive planning of the development of northern water bodies, including joint management with provincial governments of those water bodies that cross the 60th parallel, and reservation from use of lakes, or streams, and adjacent lands, if necessary, in the interests of long-term planning;
- c) maintenance of the high quality of northern waters; and

d) maintenance of acceptable engineering standards and practices for the design and construction of all works and undertakings for the use, diversion, storage or treatment of northern waters.

The Northern Inland Waters Act is the primary instrument of the Section for managing northern waters. It provides for water licencing, pollution control and comprehensive planning. Under the Act, all users of water are required to obtain a Water Licence from Territorial Water Boards located in Whitehorse and Yellowknife. The Act and its regulations went into effect in 1972.

The Section also administers the Dominion Water Power Act and Regulations, which are applicable to all water powers on federal public lands. The Regulations set out requirements and procedures to be followed by individuals or corporations wishing to investigate and develop Dominion water powers. As licences expire under this legislation, it is proposed to renew the agreement under the Northern Inland Water Act.

The Section administers the Arctic Waters Pollution Prevention Act and Regulations in regard to non-shipping activities in Arctic waters or along the Arctic coast. The legislation is intended to prevent pollution of Canada's Arctic waters and applies to such undertakings as coastal developments or offshore drilling operations for oil and gas. The Regulations set out requirements for construction and operation, and set limits of liability in respect of the deposit of waste in Arctic waters.

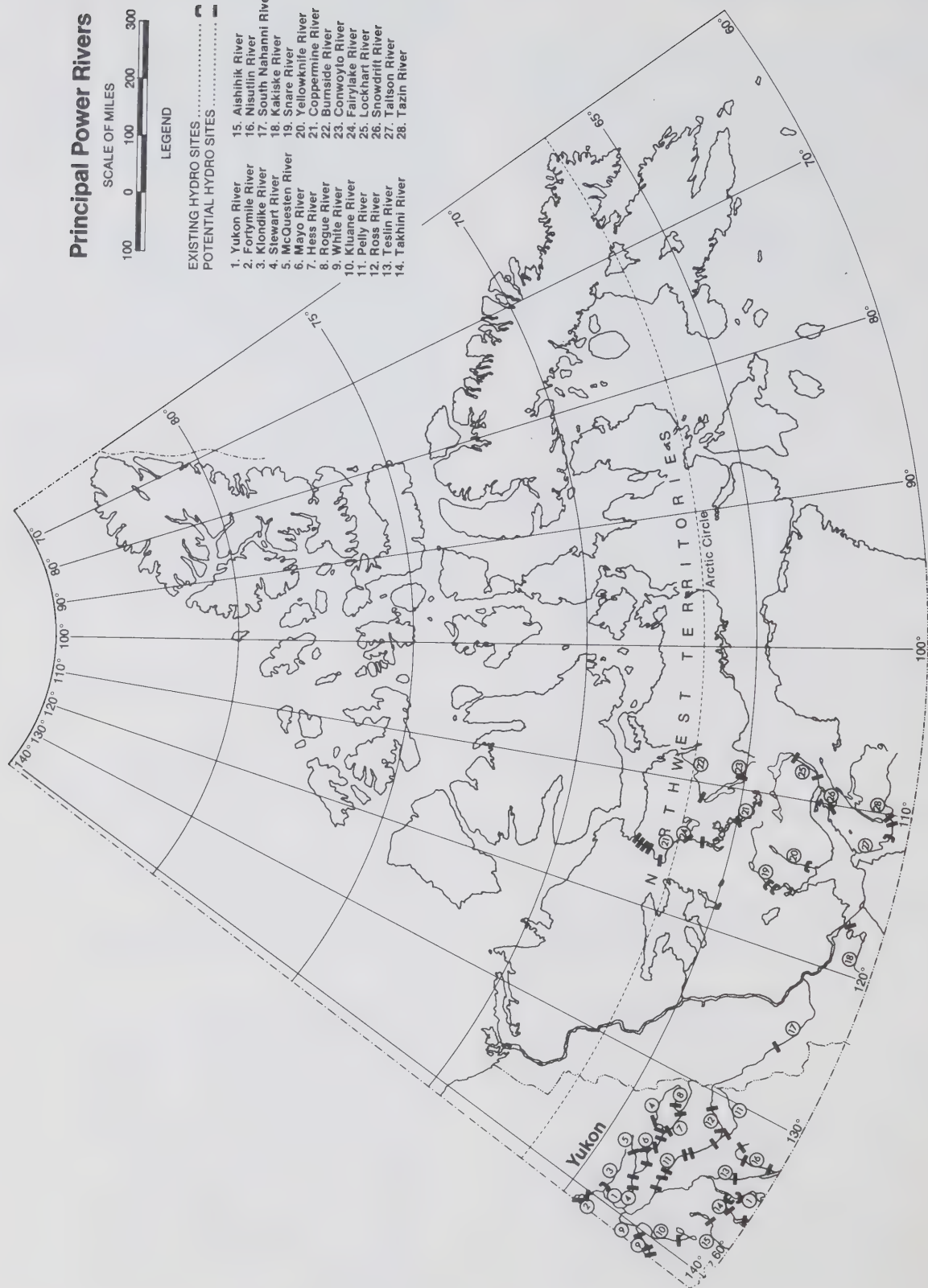
4-2.1.2 Other Federal Government Departments

The following departments and agencies have responsibilities for northern waters, of a national nature:

1. Department of the Environment — hydrometric network operation; water quality analysis; administration of the Fisheries Act; meteorological network.
2. Department of National Health and Welfare — safety of water for human consumption; sanitary waste disposal;
3. Department of Public Works — improvement and maintenance of navigation channels; construction of harbour facilities;
4. Ministry of Transport — Navigable Waters Protection Act; water transportation system.

Territorial Water Boards

Implementation of the Northern Inland Waters Act is under the regional direction in each of the Territories of a Water Board. Membership of the Board includes one person from each of the Federal Government Departments concerned with the water resources of the Territories, plus three persons from each of the two Territories, under the chairmanship of the Regional Manager of the Department of Indian Affairs and Northern Development. Boards are responsible for processing applications for a Water Licence, for setting conditions in licences relating to water use and pollution control, for conducting public hearings, maintaining water management records and generally enforcing the Act and Regulations.



Map 4-1

4-2.1.3 Northern Canada Power Commission

The Northern Canada Power Commission is a Crown Corporation concerned with the planning, construction and management of public utilities on a commercial basis. The Commission operates under authority of the Northern Canada Power Commission Act, which empowers it to survey utility requirements, construct and operate public utility plants in the Northwest Territories, Yukon Territory, and subject to the approval of the Governor in Council, elsewhere in Canada.

It is a requirement of the authorizing Act that projects undertaken by the Commission shall be self-sustaining. Consequently, rates charged for utilities supplied must provide sufficient revenue to cover interest on investments, repayment of principal over a period of years, operating and maintenance expenses and a contingency reserve.

The Commission is engaged in four main types of operations, including provision of electric service, provision of central heating, provision of water and sewerage and contract work.

By 1973 it was operating 53 electric power plants in the Yukon and the Northwest Territories.

Contract work related to the construction of utility services and repairs and maintenance of electric equipment for government departments, as required on a recoverable basis.

The Commission was formed in June 1948 under authority of the Northwest Territories Power Commission Act for the purpose of constructing and operating electric power plants in the Northwest Territories for mining and other interests. In 1949 the Act was amended to extend its provisions to include the Yukon Territory. In 1956 the name of the Commission was changed to "Northern Canada Power Commission".

Today the N.C.P.C. is the largest supplier of power in the North and is responsible for approximately 90% of the generation power North of 60. Among its major industrial customers is the Pine Point Mine on Great Slave Lake; United Keno Hill Mines near Mayo Y.T., and the Anvil Mine, northeast of Whitehorse, Y.T.

Power rates vary from under 1 cent per KWH on a wholesale basis, to as high as 20 cents per KWH in remote outlying areas, on a domestic basis. The average cost per KWH is under 2 cents and under 6 cents per KWH for domestic power where the Commission provides the necessary local distribution lines to each residence.

With the rapid development of the North it would appear that, in the public interest, the future role of the Commission will include the provision of large generating and long-distance transmission facilities in order to deliver electrical power to consumers at minimum cost.

The Commission already has the basic system for minor power grids in the Yukon, centered at Whitehorse, with its existing transmission line some 225 miles to the Anvil Mine at Faro, Y.T., and in the Northwest Territories where a minor power grid is developing in connection with the Pine Point Mine operation which could be extended to Fort Reso-

lution. At Yellowknife an existing hydro and diesel system supplies power to the city of Yellowknife and the mines in the area.

Studies are now being conducted to ascertain the feasibility of extending existing power generation and transmission systems and integrating these into a single power grid for the entire Yukon Territory and one or more moderate sized power grids for the Mackenzie River Valley section of the Northwest Territories.

For further information write:

Mr. John M. Lowe,
General Manager,
Northern Canada Power Commission,
251 Bank Street,
Ottawa, Ontario.
K1A 0H4

4-2.1.4 Stream Flow Records

The Federal Government operates a network of 85 metering stations in the Yukon and Northwest Territories to provide stream flow records on major rivers in the area. This program includes the establishment of approximately 10 new stations each year for the next five years.

4-2.1.5 Water Quality Sampling

The Water Quality Branch of the Inland Waters Directorate of the Department of the Environment has installed a limited number of quality sampling stations North of 60 as a part of a national water quality sampling network. At present 37 stations are in use. In addition a program of water sampling in streams adjacent to producing mines has been started in conjunction with the water licencing program under the Northern Inland Waters Act. Also, the Department of Indian Affairs and Northern Development is moving to establish water quality standards in the North and substantial water quality sampling will be required to compile baseline data in support of the program to set water quality standards.

Table 4-1

**Northern Canada Power Commission
Present Capacity and Kilowatt Hour Output, 1970**

NORTHWEST TERRITORIES

Plant	Utilities	Capacity	KWH Output
Taltson (Hydro)	Power	18,000 KW	110,507,360
Fort Smith Distribution System (Diesel and Gas Turbine)		2,460 KW	
Inuvik (Diesel)	Power, Heat Water, Sewerage Mtce. Services	4,500 KW	15,742,200
Fort McPherson (Diesel) (Operated for N.W.T. Gov't)	Power, Heat Water, Sewerage Mtce. Services	750 KW	1,288,310
Fort Simpson (Diesel)	Power, Heat Water, Sewerage Mtce. Services	1,225 KW	2,783,924
Aklavik (Diesel) (Operated for N.W.T. Gov't)	Power	760 KW	1,027,300
Frobisher Bay (Diesel)	Power, Heat Water, Sewerage	5,045 KW	12,107,295
Fort Resolution (Diesel)	Power	450 KW	855,680
Chesterfield Inlet (Diesel)	Power	400 KW	334,320
Snare River (Hydro) (Snare Rapids) (Snare Falls)	Power	14,000 KW	89,075,060
Standby Diesel		6,150 KW	
Cambridge Bay (Diesel)	Power	1,200 KW	1,996,760
Coppermine (Diesel)	Power	600 KW	885,135
Baker Lake (Diesel)	Power	1,354 KW	2,242,734
Fort Good Hope (Diesel) (Part Year)	Power	375 KW	268,942

YUKON TERRITORY

Mayo (Hydro)	Power	5,000 KW	27,004,960
Whitehorse (Hydro)	Power	20,000 KW	109,333,000
(Diesel)	Power	9,000 KW	
Dawson (Diesel)	Power	1,250 KW	2,331,200
(Water & Sewerage for Y.T. Gov't)	Water, Sewerage		
Norman Wells (Gas Turbine)	Power	700 KW	1,983,250
(Diesel)		800 KW	

Consolidated approximate Gross Operating Revenue (All Plants) \$9,650,000

4-3.1 Existing Hydro-Electric Generating Facilities

4-3.1.1 Yukon Territory

Three organizations are engaged in the generation, transmission and distribution of electrical energy for public consumption in the Yukon Territory.

The Northern Canada Power Commission (NCPC) operates 85 per cent of the electrical generating capacity, including the two major hydro plants in the Territory at Whitehorse and on the Mayo River. The Commission has also constructed and operates the transmission lines connecting Whitehorse and Faro, a distance of 225 miles.

The Yukon Electrical Company undertakes the bulk of electricity distribution in the territory, procuring much of the distributed power from NCPC (in the Whitehorse area.) The Company also operates a number of thermal power plants in smaller communities throughout the Yukon, and distributes the power to local users.

The Yukon Hydro Company, affiliated with Yukon Electrical, operates two small hydro generating plants on Porter and MacIntyre Creeks near Whitehorse.

There are 300 miles of transmission line in the Territory, along four separate routes. (See Table 4-3)

At the present time, the Yukon Territory has a total installed electrical generating capacity of just over 40,000 KW, of which 90 per cent is produced by harnessing water power. The hydro generating capacity of the Territory is immense, however, and current utilization of the potential capability is but a "drop in the bucket". Since the mid-1940's, a number of surveys have revealed quantitatively the tremendous hydro-electric power resources of the Yukon. (See Table 4-4)

The surveys do not include development of the headwaters of the Yukon River by diversion to tidewater. Preliminary studies have indicated that up to 3,000,000 kilowatts of generating capacity could be developed although such a project would greatly reduce the hydro capacity of the Central Yukon.

4-3.1.2 Northwest Territories

Three organizations are engaged in the generation, transmission and distribution of electrical energy for public consumption in the Northwest Territories.

The Northern Canada Power Commission operates 90 per cent of the electrical generating in the Territory, and has constructed and maintains 300 miles of transmission line from the two major hydro developments in the Territory on the Snare and Taltson Rivers to users in Yellowknife, Fort Smith and Pine Point. The Commission also operates a number of thermal plants at communities throughout the Territory, and distributes the power to local users.

Northland Utilities Limited generates and distributes power for the communities of Hay River, Fort Providence and Enterprise.

Plains Western Gas and Electric Company is engaged in distribution of electrical power to users in Yellowknife. In addition, the Departments of

Indian Affairs and Northern Development, and Transport operate generating and distribution systems in a number of far northern communities not serviced by NCPC or the private sector. (See Table 4-5)

An additional 16,500 KW of thermal power is produced and distributed in 39 communities by federal government departments and mining corporations.

At the present time, the Northwest Territories have a total installed generating capacity of approximately 80,000 KW, of which 45 per cent is produced by harnessing water power. The hydro generating capacity of the Territories' rivers is considerable, however, and greatly exceeds current requirements. Since the mid-1950's, a number of surveys have been conducted and enabled a quantitative assessment of the undeveloped hydro power resources of the Northwest Territories.

Table 4-2

Yukon Electric Power Industry

1. NORTHERN CANADA POWER COMMISSION

Location	Service	Generating Capacity (KW) and Type
Whitehorse	Generation Transmission (Faro)	20,000 hydro 10,000 thermal
Mayo	Generation Transmission (Elsa, Keno City)	5,100 hydro
Dawson City	Generation Distribution	1,250 thermal
Total		36,350

2. YUKON ELECTRICAL COMPANY

Location	Service	Generating Capacity (KW) (all thermal)
Whitehorse	Distribution and Transmission (Carcross)	
Watson Lake	Generating and Distribution	1,480
Carmacks	" "	450
Destruction Bay	" "	500
Haines Junction	" "	550
Teslin	" "	500
Beaver Creek	" "	310
Ross River	" "	260
Old Crow	" "	150
Stewart Crossing	" "	100
Pelley River	" "	100
Swift River	" "	200
Carcross	Distribution	
Keno City	" "	
Upper Liard	" "	
Total		4,600

3. YUKON HYDRO COMPANY

Location	Service	Generating Capacity (KW) (all hydro)
Whitehorse	Generation	1,650

Table 4-3

Yukon Transmission Lines

Route	Distance (miles)	Voltage	Owner
Whitehorse to Carcross	42	23 KV	Yukon Electric
Whitehorse to Carmacks	100	69 KV	N.C.P.C.
Carmacks to Faro	125	138 KV	N.C.P.C.
Mayo to Keno City	32	69 KV	N.C.P.C.

Table 4-4

Yukon Power Resources

Area	Sites Identified	Estimated Installed Capacity (KW)
1. Central Yukon		
a) Main Stem — Yukon River	10	4,477,000
b) Tributary Rivers	26*	1,480,000
2. Watson Lake area	3	410,000
3. Fort Liard area	2	125,000
		<hr/>
		Total 6,492,000

*estimated unit cost of power less than 25 mills per kilowatt hour (1967)

Table 4-5

Northwest Territories Electric Power Industry

1. NORTHERN CANADA POWER COMMISSION

Location	Service	Hydro Generating Capacity (KW)
Yellowknife (Snare River)	Generation and Transmission	14,000 hydro
Twin Gorges (Taltson River)	Generation and Transmission (Ft. Smith and Pine Point)	18,000 hydro 32,000
Location	Service	Thermal Generating Capacity (KW)
Yellowknife	Generation	6,000
Frobisher Bay	Generation and Distribution	6,000
Inuvik	" "	4,500
Fort Simpson	" "	1,500
Baker Lake	" "	1,400
Cambridge Bay	" "	1,200
Fort Smith	" "	1,000
Norman Wells	" "	900
Fort McPherson	" "	750
Aklavik	" "	750
Coppermine	" "	600
Fort Resolution	" "	450
Chesterfield Inlet	" "	400
Fort Good Hope	" "	400
Pine Point	Distribution	
Total		25,900

2. NORTHLAND UTILITIES LIMITED

Location	Service	Thermal Generating Capacity (KW)
Hay River	Generating and Distribution	2,500
Fort Providence	" "	150
Enterprise	" "	approx. 100

Table 4-6

Northwest Territories Power Resources

Area	Sites Identified	Estimated Installed Capacity (KW)
1. North West Cordillera Region	2	1,150,000
2. South West Cordillera Region	5	955,000
3. Lower Dubawnt-Kazan Basin	6	398,000
4. Thelon-Hanbury Basin	4	320,000
5. Lockhart River	6	329,000
6. Coppermine River	6	278,000
7. Tazin River	3	26,000
Total		3,456,000

4-4.1 Potential Hydro-Electric Generating Sites

Four reports on electric power potential in the Yukon and Northwest Territories are available to the public at \$15.00 each (French and English):

1. Hydro-electric resources Survey of the Central Yukon Territory (2 volumes)
2. Power Survey of the Central Mackenzie District (2 volumes)
3. Power Survey of the Liard River Basin, Yukon and Northwest Territories
4. Power Survey of the Kazan, Dubawnt, Thelon and Hanbury Rivers, Northwest Territories.

Inquiries may be directed to:

Director,
Northern Natural Resources and
Environment Branch,
Dept. of Indian Affairs and Northern Development,
400 Laurier Ave. West,
Ottawa, Ontario
K1A 0H4

North of 60

Forestry



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Forestry North of 60

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Forestry North of 60

5-1.1 General

The forests North of 60 remain an almost untapped resource. An estimated 77,000 square miles of productive forest in the Yukon and the Mackenzie District of the Northwest Territories hold an estimated 23 billion cubic feet of merchantable timber.

Because the Territorial forests are spread over such a vast area it has not yet been possible to complete a total inventory of all the timber resources. The Federal Government is now gradually expanding and updating inventory figures based on actual sampling of the more accessible stands of timber. By careful estimation of the remainder, foresters have calculated that the Northwest Territories have a minimum of 14 billion cubic feet of merchantable timber, and the Yukon Territory 9 billion cubic feet.

The northern limit of tree growth in the Territories is marked by the "tree line" which runs roughly along the line southeast from the mouth of the Mackenzie River on the Beaufort Sea, to Churchill, Manitoba, on Hudson Bay (Map 5-1). The Territorial forests are classified within the regional system of Canadian forests as the Boreal region. The most common species in the region are white and black spruce, lodgepole and jackpine, balsam poplar, trembling aspen and white birch. Also found are balsam fir and tamarack.

Up to the present time white spruce has been the only commercial species exploited to any extent North of 60. The best stands are found on the alluvial flats of the rivers where excellent growing conditions and natural fire protection have allowed the trees to reach maturity at 150 years. It is not uncommon to find spruce over 24 inches in diameter and 100 feet tall along the Lower Slave River in the Mackenzie District, or on the Liard River in the Yukon Territory and the Mackenzie District.

Mature white spruce average between 20,000 — 25,000 board feet per acre. In some instances these stands have yielded as high as 40,000 board feet per acre.

Associated with the spruce is the balsam poplar which may grow to 30 inches in diameter. Studies have shown balsam poplar can be peeled for plywood, but it has so far not been economically feasible. Generally, the balsam stands are restricted to the southern half of the Yukon Territory and the southern third of the Mackenzie District.

Jackpine is believed to be the most common species North of 60, covering thousands of square miles in both Territories. Individual trees seldom attain a diameter greater than 14 inches. However, some early estimates suggest the jackpine may occur in sufficient volumes in some areas to sustain a pulp mill.

The rotation age of the forest varies widely, ranging from 200 years for spruce in the Mackenzie Delta area near the Arctic Ocean, down to 120 years for spruce, 90 years for pine and 70 to 80 years for poplar in the Southern Regions. These latter are

probably equivalent to similar stands in central Alberta and British Columbia.

In addition to its value for commercial purposes, the forest resource North of 60 has considerable value in relation to game preservation, watershed protection, erosion control, and to the general aesthetics of the area.

5-2.1 Development

Up to the present time industrial utilization of the northern forests has been relatively small in comparison to non-renewable resource development but the value of the northern forests for the production of timber products and as a part of the natural environment is now beginning to emerge.

In recent years there has been a marked increase in the number and size of forest operations in the Territories and the demand for timber is continuing to increase, but forest production has been geared to supply limited local markets only with a portion of the Territories requirements being supplied from the south. This, however, is not indicative of what the northern forests could actually produce if called upon to do so, and forest-based industries would appear to have considerable potential for future development. It is estimated that the softwood allowable cut for the Territories could exceed 40 million cubic feet annually although full development of this potential will depend upon the establishment of economic markets and transportation facilities. Also, a large proportion of this annual cut is made up of small diameter wood only suitable for pulp or some other fibre process and it may perhaps be in this area that the forest resources of the North will find their principal use in the future.

Recent developments in timber harvesting methods, combined with increasing demand for forest products have stimulated forest industries interest in the North, with a number of new firms having already become established, and the prospect of large-scale integrated forest products operations appears likely within the next few years. These increasing demands are expected to result in improved quality of northern forests products and raises the necessity of better managed forests and an efficient forest industry North of 60.

In order to ensure proper management of the forest resource and provide adequate timber supplies to meet large capital investments by industry, procedures are being developed for the allocation of large-scale cutting rights over extended time periods of up to ten years.

5-3.1 Administration

The Northern Natural Resources and Environment Branch of the Department of Indian Affairs and Northern Development is responsible for the management of the forest and forest land resources North of 60. These responsibilities include timber management and administration, forest protection, the regulation of surface land use operations and land administration.

Branch policies are implemented by the Yukon Lands and Forest Service, with headquarters in

Whitehorse, Y.T., and the Northwest Lands and Forest Service, with headquarters in Fort Smith, N.W.T.

The Forest Services were organized in the 1940's, primarily as forest protection and fire suppression units. Gradually, they were expanded to include timber administration. General improvements, carried out over the years, have led to the present modern, relatively well-equipped organizations.

Forest management offices have been established in each of the various administrative districts of the two Lands and Forests Services. Depending on the size of an administrative district or area, the permanent staff might include a district superintendent, a resource management officer, a fire control officer, clerks and radio operators. In addition, rangers, summer seasonal personnel and lookout men are positioned at strategic points during the fire season. (see map 5-2, 5-3).

Forest fire management is a major activity of the Yukon and Northwest Lands and Forest Services. Intensive fire control capability is provided on 132,000 and 56,000 square miles in the Northwest Territories and the Yukon Territory, respectively. Of the annual average of over 400 fires actioned by the two Services, about 45% are lightning-caused. Owing primarily to the large areas receiving protection, lack of ground-access and extreme burning conditions during the summer months, heavy reliance is placed on various types of aircraft for detection and fast initial action by trained fire-fighters.

Because of the large areas involved and the limited number of personnel and communications, a system of firm protection priorities has been established. The system is based on the relative values of the resources being protected. The areas of priority are mainly those in which the highest concentration of value exists, these being near communities, the areas of high timber volume, wildlife habitat and domestic watersheds, young growth of potential value and along the main travel routes. It is recognized that the North is and has been a natural fire environment; hence, some fires in the remote regions are allowed to burn without interference by man.

Fire control capability is also provided on both non-productive forest land and non-forested land in the interests of protection of wildlife and the continuity of trapping, which is still important to a segment of the indigenous population. Protection priorities are regularly assessed and changed when necessary.

5-3.1.1 Regulations

The forests of the Yukon Territory and the Northwest Territories are a Federal responsibility. They are administered under the Federal Territorial Lands Act and by the Territorial Timber Regulations issued under authority of the Act. The Act and Regulations bear out the basic policy of the Federal Government with respect to the northern forests; that is, the encouragement of the best possible utilization of the resource and the assurance of a reasonable return in the form of royalties, stumpage and rentals.

The Territorial Timber Regulations govern the cutting and removal of timber on Territorial lands in the Yukon and Northwest Territories and cover the issuing of permits, the seizures of timber products, the general requirements for forestry operators and the dues payable to the Federal Government for timber cut.

Legislation for forest protection is handled by each Territory through its own Forest Protection Ordinance, formulated and passed by the councils of the Yukon and Northwest Territories. Traditionally, the councils have made forest protection their own legislative responsibility even though the Territorial forests are administered by Federal Government. The Forest Protection Ordinances are enforced by the two Lands and Forest Services.

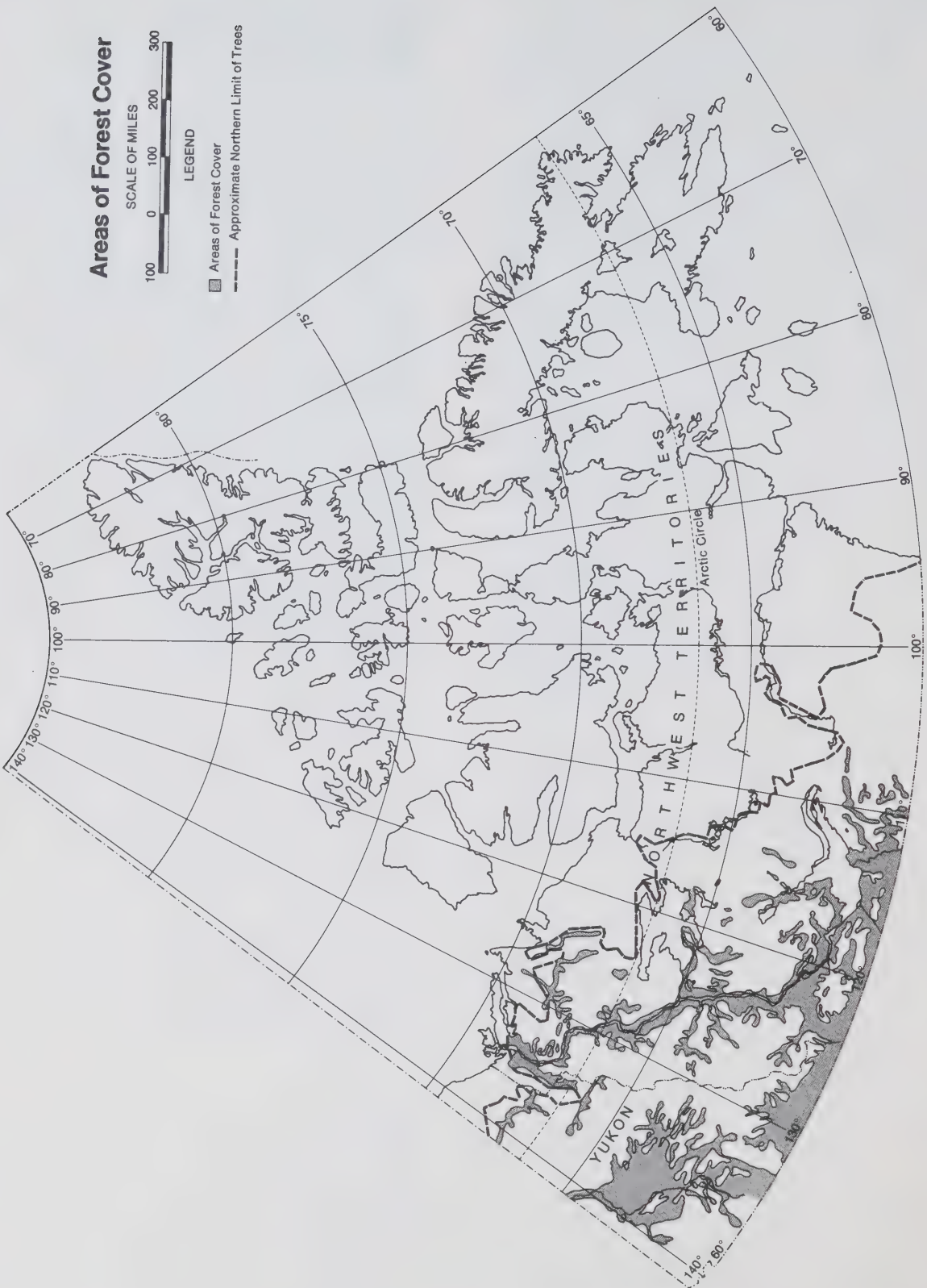
The Yukon Forest Protection Ordinance and the Northwest Territories Forest Protection Ordinance are similar in content and are concerned with such areas as the appointment, powers and duties of forestry officers, regulations, general protection and prohibitions, closed seasons and assistance in fire-fighting. The Ordinances provide for the establishment of a closed season each year, normally from May 1 to September 31, during which fires may not be lit without first obtaining a permit.

For further information write:
Administrator of Northern Forests,
Northern Natural Resources and
Environment Branch,
Department of Indian Affairs and
Northern Development,
400 Laurier Avenue West,
Ottawa, Ontario
K1A 0H4
Superintendent,
Yukon Lands and Forest Service,
Whitehorse, Y.T.
Superintendent,
Northwest Lands and Forest Service,
Fort Smith, N.W.T.

Table 5-1

**Wood Utilization in the
Yukon and Northwest Territories
1961 — 1972**

Fiscal Year	Territory	Lumber (fbm)	Round Timber (lineal feet)	Fuelwood (cords)
1961-62	N.W.T.	1,049,000	584,000	1,410
	Y.T.	4,037,842	918,987	6,249
1962-63	N.W.T.	2,060,055	17,000	3,741
	Y.T.	8,096,274	2,103,375	6,892
1963-64	N.W.T.	2,271,533	50,134	3,944
	Y.T.	8,999,037	2,723,456	5,902
1964-65	N.W.T.	1,358,295	184,275	2,501
	Y.T.	6,557,695	2,308,751	8,677
1965-66	N.W.T.	2,522,947	251,268	8,645
	Y.T.	2,654,054	1,197,300	6,798
1966-67	N.W.T.	3,501,600	427,130	8,295
	Y.T.	5,213,882	1,626,296	8,411
1967-68	N.W.T.	2,365,877	436,575	8,434
	Y.T.	7,049,647	427,486	8,545
1968-69	N.W.T.	2,736,062	128,555	1,023
	Y.T.	7,680,707	1,150,690	10,080
1969-70	N.W.T.	5,089,776	295,670	1,457
	Y.T.	12,058,470	650,583	6,084
1970-71	N.W.T.	3,873,000	539,965	1,763
	Y.T.	5,459,335	710,480	5,487
1971-72	N.W.T.	1,405,000	820,000	2,696
	Y.T.	4,713,275	905,355	7,449



Map 5-1



Map 5-2



Map 5-3

North of 60

Land



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Land North of 60

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Revised January, 1974

Land

6-1.1 General Land Use Management

"Land use" as applied in this section refers to land conservation and protection.

Due to the accelerated rate of exploration and development activity in the northlands and the adverse effects this activity can have upon the northern ecosystem it has become necessary to apply some measures of control over these activities in order to minimize surface disturbances, and also to provide liaison between northern residents, particularly Eskimos and Indians, and industrial organizations engaged in resource development activities in the North.

Consideration is given to human and social needs as well as economic development requirements.

6-2.1 Administration

The Land Use Management Section is organized under the Water Lands and Forests Division, Northern Economic Development Branch, Department of Indian Affairs and Northern Development. Application for a permit to carry out a land use operation can be obtained from the Regional offices situated at Yellowknife and Whitehorse. Permits are also issued from these Regional offices.

6-3.1 Regulations

6-3.1.1 Territorial Land Use Regulations

The Territorial Land Use Regulations were promulgated under authority of amendments to the Territorial Lands Act passed during the 1970 session of Parliament. These regulations set out and provide authority for the enforcement of rules and procedures to be followed by all individuals and companies carrying out operations on Territorial lands. The regulations are designed to prevent needless damage to the northern environment and to protect the unique physical characteristics and the fragile ecological balance of the region.

The regulations are divided into three parts. Part I sets out regulations pertaining to land use which apply throughout the Yukon Territory and the Northwest Territories. Part II sets out regulations that, in addition to the general regulations will apply within Land Management Zones. These Land Management Zones are areas designated by the Governor-in-Council under authority of the amended Territorial Lands Act and cover areas of special environmental sensitivity and concern. Within a Land Management Zone, and only in these areas, all operators are required to obtain a land use permit prior to commencement of land use activities on public lands. Part III of the regulations deals with the powers of officials administering the regulations, penalties, appeals and procedures.

Before allowing an operation to proceed, all applications for a land use permit are reviewed by a Land Use Advisory Committee who recommend appropriate stipulations for the control of that operation. This committee is composed of repre-

sentatives of the D.I.A.N.D. as well as other appropriate Federal and Territorial government departments. Enforcement of the Regulations is carried out by Resource Management Officers situated throughout the Yukon Territory and the Northwest Territories.

During the first year that the Regulations were in effect, approximately 400 permits were issued with the majority, about 80%, issued with respect to petroleum exploration activities and the remainder for mining exploration, road and airport construction, access roads and various other activities.

6-4.1 Research

6-4.1.1 Arctic Land Use Research

The Arctic Land Use Research (ALUR) program has been established by the Department of Indian Affairs and Northern Development to detect and define environmental problems affecting land use and to devise and test alternative land use operational procedures.

The program, commenced in 1970, has begun a series of mission oriented scientific projects such as to determine the effects of different types of tracked vehicles employed in the Arctic, the effects of oil spills under northern conditions, plant regeneration on seismic line disturbances, mine waste containment and the effect of removing forest cover on erosion and other natural processes. The preparation of terrain sensitivity maps and of land use information maps which present the available information on renewable resources and man related activities has also been undertaken. Substantial results have been obtained from the vegetation and terrain disturbance studies in the Mackenzie Delta and attention will now be directed to similar problems in the Arctic Islands. The results obtained to date are proving valuable in the administration of the Territorial Land Use Regulations and in consideration of the Mackenzie Highway and proposed pipeline routes.

ALUR projects are usually carried out by university scientists under a contractual arrangement, a few are co-operative projects with industry and the mapping projects referred to above have been undertaken by the Geological Survey of Canada and the Lands Directorate, Department of Environment, respectively. The results of the research are made available to industry and the public and this, together with the close co-operation of personnel from industry, government and the university community which is a consequence of the way in which the program is administered, are contributing materially to a better understanding of the northern environment.

6-5.1 General

The Yukon and Northwest Territories are not agricultural areas. A number of factors are involved, such as the limitation of crop growth by short growing or frost-free seasons, unsuitability of most of the land area for cultivation and high transportation costs.

Consequently, farming on a successful full-time basis has limited possibilities, both from the technical and economic point of view. Although there are some potential agricultural areas in the region, attempts at farming will be confined for a long time to specialized and marginal operations.

Despite these land utilization problems, land use has accelerated in recent years. For example, there were 577 land leases and agreements of sale in force at March 31, 1953, compared to 1,878 at March 31, 1973, with many of the earlier sale transactions being completed in the intervening years.

The best growth potentials are to be found in those activities which are dependent on land, such as industrial and urban expansion, outdoor recreation, trapping, hunting and fishing. (See map 6-1).

6-5.1.1 Administration

Jurisdiction over vacant lands in the Yukon and Northwest Territories is exercised by the Federal Government and the appropriate Territorial Government. All Crown lands under the control and management of the Minister of Indian Affairs and Northern Development are administered pursuant to the Territorial Lands Act and the Territorial Lands Regulations.

An extensive administrative organization has been established by the Department to implement the Act and Regulations. Land Offices are located at Watson Lake, Whitehorse, Mayo and Dawson in the Yukon Territory, and at Fort Smith, Hay River, Fort Liard, Yellowknife, Fort Simpson, Inuvik and Snowdrift in the Northwest Territories.

In the settlements in the N.W.T. the Territorial Government is responsible for receiving applications for land.

To improve the service to those interested in land, the administration of leases and agreements for sale has been transferred from Ottawa to Whitehorse and Yellowknife.

Administration of all Crown-owned lands in and immediately surrounding the established communities is being transferred to the Territorial Governments under a 5-year program. These "Territorial" lands are administered by the Commissioner of the Yukon Territory or the Northwest Territories, as appropriate, pursuant to the Yukon Territorial Lands Ordinance or the Northwest Territories Commissioner's Land Ordinance.

6-5.1.2 Land Disposal Policy

Vacant land North of 60 is available to any person over 19 years of age and to any corporation for any legitimate purpose. The basic aim of the land policy is to make land available when and where it is required, consistent with the protection of the public interest.

One of the main principles of land policy is that initial occupation must be authorized by a lease or an agreement for sale. Only in extenuating and unusual circumstances will consideration be given to granting title before specified improvements have been made.

In most cases this involves the construction of buildings or other structures directly related to the indicated land use.

An agreement for sale is issued for a term of five years and leases may be granted for any period up to 30 years.

Appropriate stipulations are inserted in the leases and sale agreements as required, to protect the environment against pollution and other ecological hazards.

Other aspects of land policy:

The area of any parcel leased or sold shall not exceed what is reasonable for the purposes for which the land is to be used.

Title to the land may not be issued until the land has been surveyed and the plan registered. Cost of the survey must be paid by the purchaser.

Land within 100 feet of the high water mark of a body of water may be leased but cannot be sold. Under normal circumstances, a lessee, upon expiration of his lease may obtain a renewal, or if a renewal cannot be granted or is not required, he may remove his improvements from the land and is given a stated time in which to do this.

Under an agreement for sale the purchaser may pay for land in five equal annual installments and provided the terms and conditions of the agreement have been met may then obtain title.

Any person desiring to acquire land must select the parcel of land he desires. Agents in the land offices are always willing to assist the applicant in this task.

No lease or agreement for sale of land includes mines and minerals including oil and gas, merchantable lumber or the bed of any lake or stream.

The sale and leasing of Crown lands, other than lands suitable for grazing or muskrat farming are limited to 160 acres and 640 acres respectively to any one person unless otherwise approved by the Governor in Council.

Not more than 6,400 acres of lands suitable for grazing or muskrat farming may be leased to any one person without the approval of the Governor in Council.

Lands suitable for muskrat farming may not be sold. The annual rent payable under all leases is set at not less than 10% of the appraised value of the land or \$25.00, whichever is greater.

6-5.1.3 Residential, Commercial and Industrial Lands

Land for residential, commercial or industrial use may be occupied under a lease or an agreement for sale. The occupant is given two years in which to complete a house or other improvements to the land. When the required improvements have been completed and the lease contains an option to purchase, he may apply to have the land surveyed and to purchase it. The prices at which these types of land are sold vary according to the location of the land with respect to the nearest settlement, highway, lake or river, airport, etc.

Where warranted, industrial parks have been established, such as those at Whitehorse, Y.T. and Pine Point, Hay River, Inuvik, Fort Simpson and Yellowknife, in the N.W.T.

Lands for sport fishing camps and similar tourist establishments are normally leased for an initial term of five years, including the main camps or lodge sites and the outpost camps operated in conjunction with the main establishment. In all cases the granting of building permits and business licences by the Territorial Governments are pre-requisites to the issue of leases or subsequent renewals.

6-6.1 Agricultural Lands

Because of the extremes in climate and high costs of transportation to and from the Territories farming is expensive, and obtaining loan capital at reasonable rates of interest is difficult. As a result, homesteads are not authorized North of 60. However, if a person wishes to undertake full-time farming and has the financial resources to see him through the initial years before a return on the land can be realized, he may apply for land up to 160 arable acres within an area designated by the Department of Agriculture as being suitable for farming. Initial occupation is under a lease issued for a five-year term with the lessee being required to construct a house and to place a stated acreage under cultivation before the lease expires. The lease may contain an option to purchase at prices determined at the time of application when the land is inspected. Prices are based on the following minimum figures:

Class 1: Land open or easily cleared	\$5.00 per acre
Class 2: Land requiring moderate clearing	\$3.00 per acre
Class 3: Land not included in classes 1 or 2	\$1.00 per acre

When the improvements specified in the lease have been completed, the lessee may apply to have the land surveyed and subsequently purchase it.

6-6.1.1 The Yukon Territory

Agriculture in the Yukon goes back to the days of the Klondike Gold Rush of the 1890's, but no significant expansion has ever taken place. In addition to the limiting factors of weather and soil, the region, at present, is too remote from major urban markets and sources of supply to warrant volume production. Transportation costs are a significant obstacle in obtaining agricultural needs and shipping produce. In addition, the Territory lacks the necessary local markets which could support specialty products.

Yukon agricultural soils occur only in intermittent pockets and narrow bands along main rivers and their tributaries. To assess the amount of land suitable for agriculture a number of field studies have been completed by the Department of Agriculture.

The following areas are considered potentially suitable for agricultural use:

Takhini and Dezadeash Valleys	205,500 acres
Yukon River and Tributaries	60,000 acres
Tagish and Little Atlin areas	8,000 acres
Dawson area	6,000 acres

Most of this land is forest covered. In addition, the frost-free period is short and often there is insufficient moisture for rapid growth. This is offset, in part, by the extended periods of light which accelerates normal growth. Most of the soils in the Yukon are rather acid and natural fertility falls off rapidly. Despite such difficulties experience has shown that early varieties of grain and potatoes can be successfully grown in some places.

There is some small-scale truck gardening and mixed farming, particularly in the vicinity of Whitehorse, but, the raising of beef cattle is the main agricultural activity (most beef raised is consumed locally). Lands for market gardening are usually within a reasonable distance of a settlement and are acquired in relatively small parcels of 20 acres or less. As with all other lands, occupation is, in the first place, authorized by an agreement for sale or a five-year lease with the usual requirements with respect to construction of a dwelling and the cultivation of a stated acreage within the five years. In the case of grazing lands, the land is not sold except for a parcel of up to 160 acres for the home site, ranch buildings and production of winter feed. The occupation of the actual grazing land is by lease only.

The 1961 Census showed that there were 33 separate parcels of land held in the Yukon for agricultural or grazing use under lease or agreement of sale. The total area involved was 10,300 acres. In addition, applications for another 33 parcels containing 10,600 acres were pending. The census listed 15 farms and reported the value of products sold at \$15,600. About 12% of the farmland was classed as improved. By 1965 the area held for agricultural or grazing purposes by lease or agreement for sale had risen to 27,700 acres with applications for a further 3,000 acres pending. Most of the existing and pending agreements were for grazing only. At the end of March 1970 there were 55 leases for agricultural purposes involving approximately 2,500 acres, and 76 grazing leases comprising some 35,000 acres in force. Twenty-six of the agricultural sites were also used for residential purposes.

To assist in the development of agriculture in the Yukon the Canada Department of Agriculture operated an experimental farm at Haines Junction, Mile 1019 on the Alaska Highway from 1944 to March 31, 1970, when their research program was completed. Information on the results of the research studies is available from the Information Division of the Department of Agriculture at Ottawa.

6-6.1.2 Northwest Territories

There are between 3,500,000 and 4,000,000 acres of arable land in the Northwest Territories. As in the Yukon, although the season is short, growth is

assisted by the long summer days. Growth is further helped by the fact that permafrost aids in holding the available moisture in the ground.

Wheat coarse grains give good yields and root vegetables, tomatoes, berries and tree fruits are grown successfully on a small scale. The Canada Department of Agriculture operated an experimental station at Fort Simpson on the Mackenzie River until March 31, 1970, when their research program was completed. Details of their studies are available from the Information Division of the Department of Agriculture at Ottawa.

The soils with agricultural potential are located in the District of Mackenzie. Soils in the Districts of Keewatin and Franklin are not suitable for agricultural use. As in the Yukon, the suitable soils are located mainly along river valleys. The major areas of potential use are along the Slave, Hay, Liard and Mackenzie Rivers.

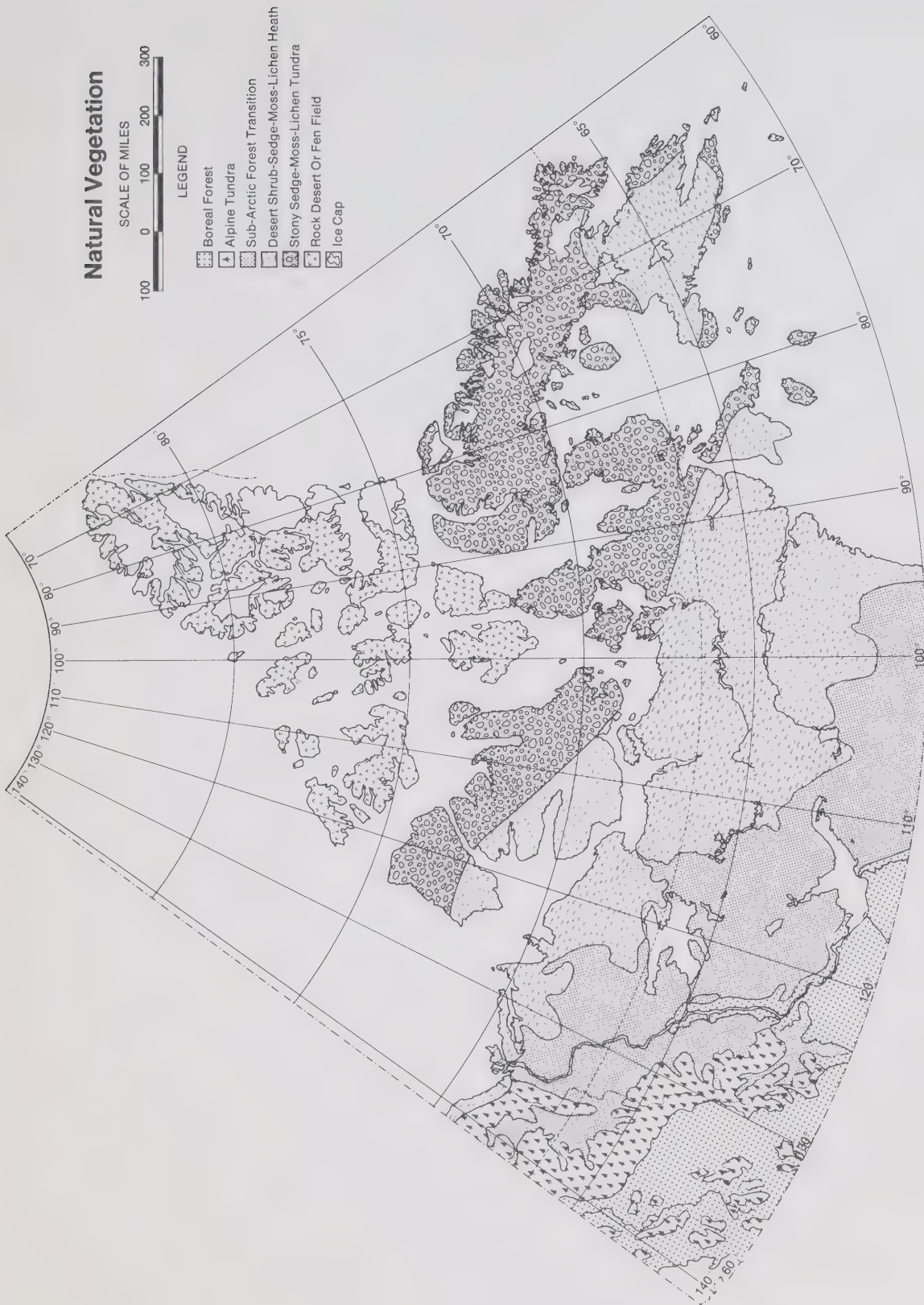
The largest arable section of the Northwest Territories contains about 2,000,000 acres and is located along the Slave River, north of Fort Smith. The ratings of the soils in this area are as follows:

Rating	Area of Arability Acres	Classes Percent
Class 1 (arable-no limitation)	397,300	18.3
Class 2 (moderate limitation)	1,182,400	54.3
Class 3 (requires intensive management)	116,300	5.4
Class 4 (non arable)	356,000	16.2
Lakes and Rivers	127,000	5.8
Total	2,179,000	100.0

The lowlands adjacent to the Liard River are an extension of the more southerly Peace River Block and are considered to have a high potential. The soil ratings for this area are as follows:

Rating	Area of Arability Acres	Classes Percent
Class 1 (arable-no limitation)	nil	
Class 2 (moderate limitation)	75,900	5.6
Class 3 (requires intensive management)	378,500	28.1
Class 4 (non arable)	311,500	23.0
Class 5 (limited capability)	341,400	25.3
Other	243,400	18.0
Total	1,350,800	100.0

The potentially arable areas on the Mackenzie River is estimated to contain approximately one million acres of agricultural land but no detailed classification is available for this area for the potentially arable lands along the Hay River and along the shores of Great Slave Lake.



Map 6-1

North of 60

Tourism and Recreation

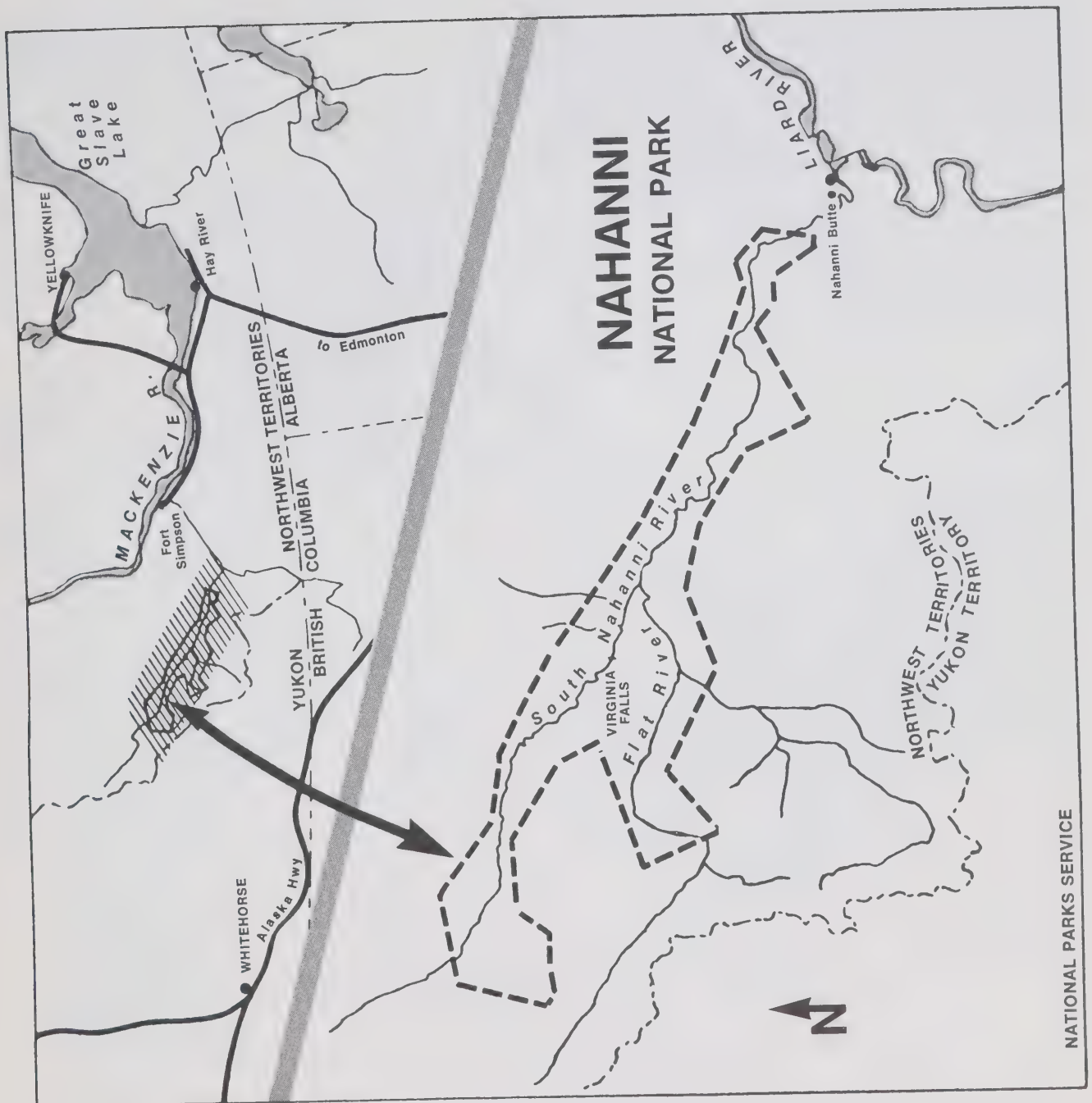


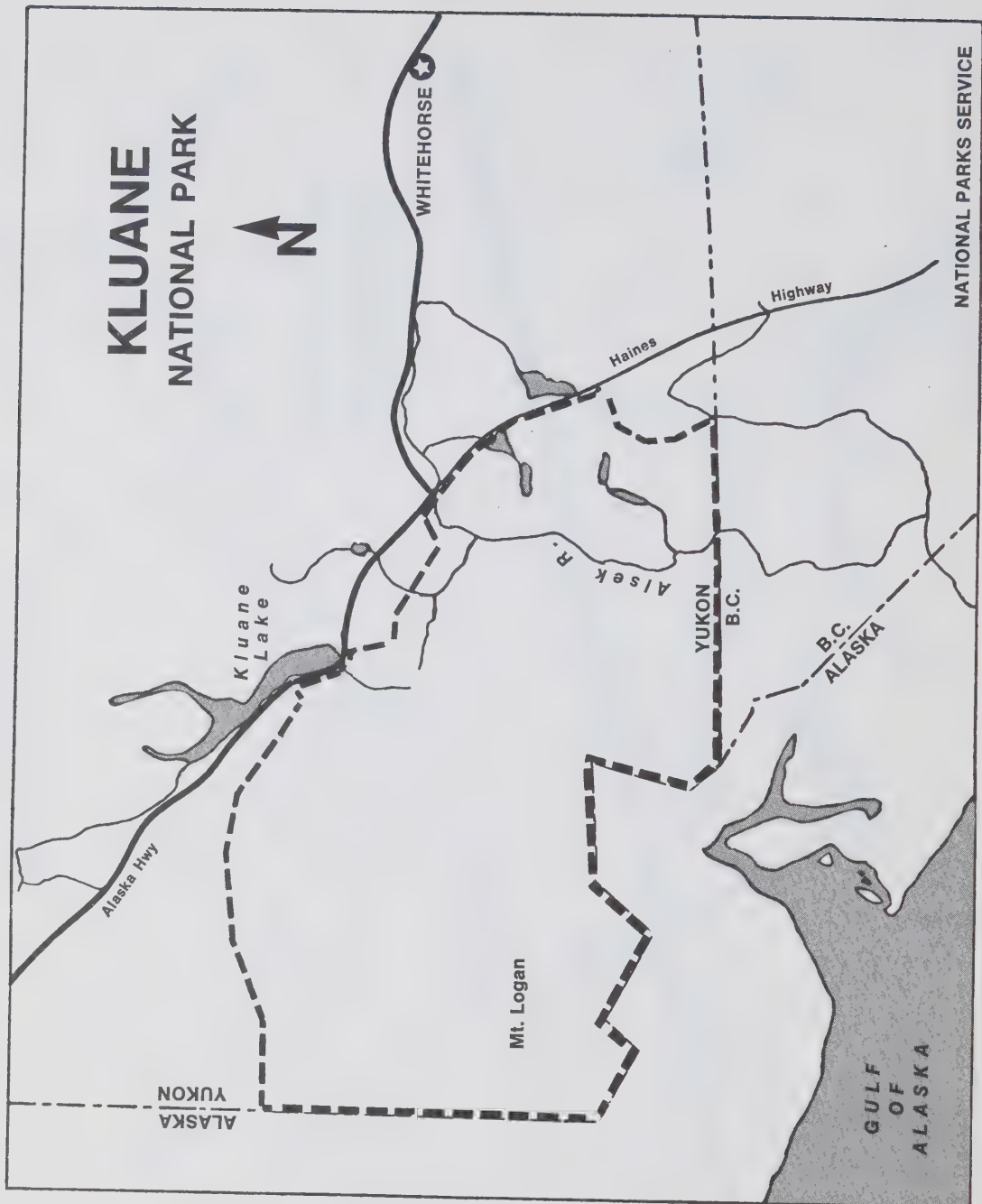
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Tourism and Recreation

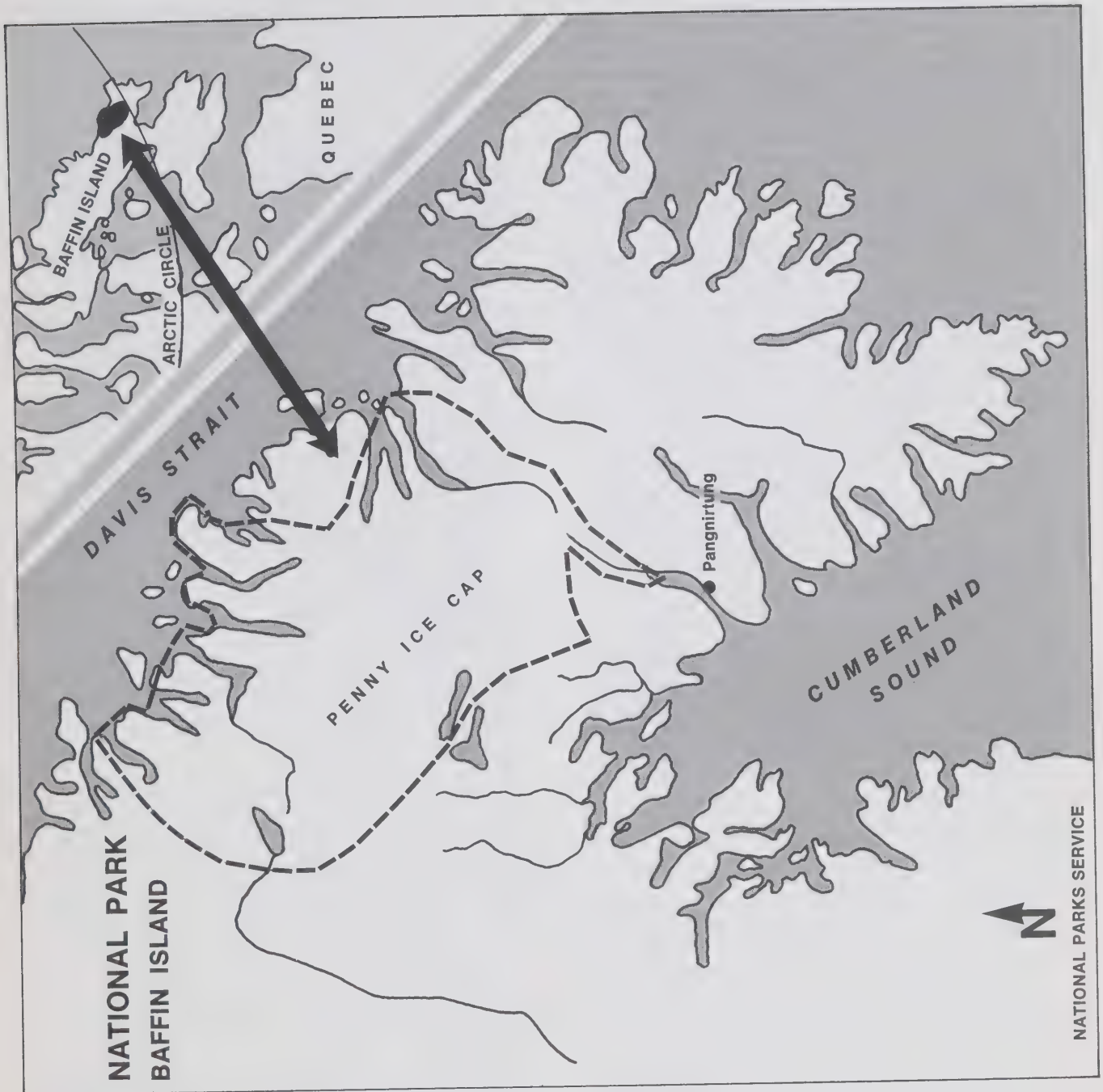
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7-3 Baffin Island National Park	

Revised January, 1974





Map 7-2



Tourism and Recreation North of 90

7-1.1 General

Canada North of 60 is one of the world's last frontier regions, and therefore offers unique opportunities for both the investor and the visitor. The Yukon and Northwest Territories offer a breathtaking range of scenery, from the towering mountains of the Yukon, to the broad sweep of the Mackenzie River valley, the rolling tundra and lake country of the Keewatin District and the glaciers of the Arctic Archipelago.

In 1972 the Federal Government moved to preserve representative areas of the Canadian north by creating three National Parks, the first such parks North of 60.

Nahanni National Park (Map 7-1) in the Northwest Territories covers 1,840 square miles, and includes the South Nahanni river, Canada's most spectacular wild river, and Virginia Falls, twice as high as Niagara Falls. The park also includes three major canyons reaching 4,000 feet in height and a vast number of caves and sulphur hot springs. The park is not yet accessible by road.

Kluane National Park, (Map 7-2) covering 8,500 square miles, lies in the southwest corner of the Yukon Territory and includes Mount Logan, the highest peak in Canada, and one of the world's largest non-polar icefields systems, as well as large and varied wildlife populations. The Alaska Highway and Haines Highway are on the park's northeastern boundary and accommodation is close by.

Baffin Island National Park, (Map 7-3) 8,200 square miles in size, is located mainly north and west of Pangnirtung Pass in the Cumberland Peninsula of Baffin Island. It is the first national park lying above the Arctic Circle. The area is noted for its spectacular fjords and deeply carved mountains dominated by the massive Penny Icecap. Mountains reach 7,000 feet and the Pangnirtung Pass, 60 miles long and often a mile deep, is ice free. The park is accessible by air.

The Federal Government is now preparing master plans for the new national parks in readiness for the expected influx of tourists looking for a true northern wilderness experience.

The demand for better accommodation and more recreation facilities in the Yukon and Northwest Territories today provides many opportunities for potential investors. In the past the normal tourist season North of 60 lasted from June to August. However, the interest in the region has grown so rapidly that the season now runs from May to October.

Commercial jet service to all parts of the Arctic from Southern Canada has brought the area within a few hours' flying time. Excellent hotels and motels are now available in most of the major centres and in the smaller and more isolated communities accommodation is becoming more readily available.

A small business loan fund established by the Federal Government to assist entrepreneurs in both

Territories is facilitating the establishment and expansion of such service industries as motels, hotels, restaurants and stores.

Further information on the Small Business Loan Funds may be obtained from:

Director,
Territorial & Social Development Branch,
Department of Indian Affairs and
Northern Development,
400 Laurier Avenue West,
Ottawa, Ontario
K1A 0H4

7-2.1 Yukon Territory

Tourism is now the Yukon Territory's second largest industry, having grown from less than \$2,000,000 in 1962 to about \$12 million in 1971.

A study of the Yukon economy, commissioned by the Department of Indian Affairs and Northern Development* indicates the significance of the industry's economic potential. Although still seasonal, it acts as a balancing element in an economy dominated by the volatile and uneven growth of the Territorial mining industry.

The industry itself has been making a steadily increasing contribution to the economic growth of the Territory, and, as North Americans move greater distances to seek wilderness recreation the Yukon is proving to be particularly attractive to an increasing number of families who have the leisure and income to enjoy it.

The Yukon offers magnificent natural attractions to the tourist:

- the altitude and dryness of the air which seem to add a stimulant to the Yukon atmosphere.
- the great rings of mountains that surround the central plateau.
- the rugged hills within the central plateau.
- the majesty of the Yukon River and its tributaries.
- the calm beauty of the great lakes reflecting the hills behind.
- the wide forested valleys.
- the abundant wildlife.

The economic study indicated that 80 per cent of the tourists visiting the Yukon are from the United States with California, Washington, Alaska and Michigan the largest contributors.

Between May and September, 1971, a total of 183,681 visitors cleared Canadian customs, en route to the Yukon, an increase of 17 per cent over the same period in 1970.

Approximately 75 per cent of the tourist visitors come to the Yukon by private car, 15 per cent by air and 10 per cent by bus. Bus package tours have become an increasingly popular way of seeing the Yukon.

Improved transportation routes are stimulating increased interest by wilderness seekers, particularly the new "marine highway". This route utilizes the British Columbia ferry system, roads on Vancouver Island, the Alaska State ferry system and the ports

*The Yukon Economy D. W. Carr and Associates Ltd., Ottawa, Nov. 1968.
Available from Information Canada.

of Haines and Skagway, Alaska, from which highway access to the Yukon is available. Travellers on the marine highway may then return to southern Canada and the United States over the Alaska Highway.

Some approximate road distances to Whitehorse, Y.T. from:

New York	4100 miles
San Francisco	2700 miles
Seattle	1800 miles
Vancouver	1700 miles
Edmonton	1287 miles

A new 370-mile highway running between Watson Lake, Ross River and Carmacks offers a second route to Dawson, a mecca for tourists seeking relics of the spectacular Klondike gold rush days of the 1890's and to Alaska. As traffic volume increases on this highway the demand for tourist services is bound to provide new opportunities for investors.

A network of 41 government campgrounds provides basic facilities for campers. The growing demand for sewer, water and hydro connections has encouraged construction of trailer parks by private operators in some areas.

7-3.1 Northwest Territories

The tourist industry potential of the Northwest Territories is impressive. The acceleration of resource development activity, coupled with rapidly increased transportation facilities, and a general interest in the region, have combined to create a favorable climate for investment in the industry.

While still comparatively modest, the volume of tourists arriving in the Territories is growing annually, from 9,000 in 1968 to 17,700 in 1971. Expenditures have increased from \$3,190,000 to \$5,536,000 in the same period.

Surveys taken in 1971 revealed that the average expenditure per person was \$310.00, \$220.00 being spent by Canadian Residents and \$450.00 by United States Residents, during their stay.

Number and Types of Tourist Visitors — 1971

Type of Tourist Method of Entry into N.W.T.	Number of Tourists		
	Canadian Resident	United States Residents	Total Persons
Highway	6,500	2,500	9,000
Lodges & Outfitters	500	3,300	3,800
Air — Scheduled			
— Special			
Charters	3,100	800	3,900
Others	500	500	1,000
Totals	10,600	7,100	17,700

Sightseeing, photography, shopping, fishing and visiting museums proved to be the major attractions in that order.

Extension of the highway system linking the Territories to southern Canada and the United States has made such communities as Yellowknife, Enterprise, Hay River, Fort Smith, Pine Point, Fort

Providence and Rae, Fort Resolution and Fort Simpson possible tourist destinations.

The network of campgrounds and picnic sites, under the jurisdiction of the Division of Tourism and Outdoor Recreation, is being built up along the highway system.

Scheduled and charter air service is available to tourists throughout the Territories. Jet service is available between Edmonton, Hay River and Yellowknife, and between Montreal and Frobisher Bay.

Tourist promotion is now carried on actively in Canada and the United States.

The Northwest Territories Tourist Association, representing carriers, operators and others interested in tourism, holds annual conferences to recommend new policies and programs for tourist development in the region.

The attractions of the Northwest Territories are unique and diverse. Big game hunting in the Mackenzie Mountains, opened in 1965, has become one of the major attractions among outdoorsmen, with Dall sheep, grizzly bears, moose and mountain goats available for trophies. Sea mammal hunting is an increasingly popular experience, available in the eastern Arctic. Licence fees for seal are \$20.00 non-resident Canadian and \$25.00 for others/and for white whale, Resident \$10.00; non-resident Canadian \$20.00; Others \$25.00. White whale \$10.00, \$20.00 and \$40.00. (1972 quotation)

Hunting and fishing in the Keewatin District is unusual and challenging. The season starts with seal hunting during the early part of May and continues over the spring break-up into the fishing season, usually beginning around June 25 and lasting until mid-September.

LIMITS: 2 seals a year. 1 whale a day and 2 in a year. For a sea mammal licence, a "Resident" is a person who has resided in the Territories continuously for the past one year. (1972 quotation)

Prolonged daylight during the summer months provides the outdoorsman with opportunity for round-the-clock activity. As the rivers race from the lakes at flood level toward the end of June the Arctic char begin their annual migration to the sea. This is the period when they are more voracious and more attracted to the fisherman's lure. They remain in the sea, congregating around the mouth of rivers until September when they move back upstream to the spawning and wintering grounds in the lakes.

From break-up to freeze-up, grayling and lake trout swarm in the rivers and lakes.

Non-resident angling licences cost \$10.00. (1972 quotation).

In 1966, the Department of Indian Affairs and Northern Development established a small tourist camp at Rankin Inlet, to demonstrate the feasibility of tourist development in the area. Subsequently, similar camps were established at Baker Lake and Whale Cove. The camps at Rankin Inlet and Baker Lake are now run by private entrepreneurs.

Yellowknife, capital of the Northwest Territories, boasts the only golf course North of 60, and during July, when the sun never sets, 24-hour golfing marathons are a popular sport.

The Great Slave Lake region surrounding Yellowknife is a source of interest to the geologist and rockhound, being rich in Paleozoic fossils and a wide range of rocks and minerals such as beryl, amethyst, garnet, jasper, rose quartz, serpentine and tourmaline.

The Mackenzie River and its tributaries, the Slave, the Nahanni, the Liard and the Peel, provide thousands of miles of navigable water. The Mackenzie, one of the world's largest rivers, has historically been the main water transportation route in the Northwest Territories. Many of the historic settlements of the Territories are scattered along its banks.

The Hudson's Bay Company, which has encouraged tourism in the Territories, from the early days when the firm operated a paddle steamer on the Mackenzie, has kept pace with the times by introducing a U-Paddle canoe rental system North of 60. For further information write:

TravelArctic,
Government of the Northwest Territories,
Yellowknife, N.W.T.

North of 60

Transport



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Transport North of 60

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Revised January, 1974

Transport North of 60

8-1.1 General

As the pace of economic development North of 60 accelerates, an economic, efficient transportation system serving the Yukon and the Northwest Territories is being developed by the Federal and Territorial Governments and by private enterprise.

Continuing technological improvements in the various modes of transportation are resulting in greater mobility and lower transport costs.

Physical barriers remain the biggest challenge North of 60. Although areas of the Yukon are no more than 100 miles from Pacific tidewater, the Coast Range Mountains, rising sharply out of the Yukon plateau, seal off the Territory inland.

Several passes through these mountains have provided some links with the Pacific, but the costs of building and maintaining permanent routes through the Coast Range have been formidable.

The great distances of the Northwest Territories, separating the source of resource material from the ultimate destination in southern Canada and overseas, the relatively small volumes of traffic moving into and within the Territories, and the seasonal nature of much of the existing transportation system, all combine to throw up huge obstacles against the speedy development of an efficient service.

The Federal Government, which has jurisdiction over the Yukon and the Northwest Territories, is heavily involved in providing a variety of transport facilities throughout the two regions. On the one hand it is making direct expenditures in the establishment of the facilities, and on the other, it has a number of programs underway to assist private enterprise in building facilities necessary to the development of resource industries, such as the Northern Roads Network Program and the Northern Resource Airports Program.

8-1.1.1 Rail

Each of the Territories is served by a railway line:

The White Pass and Yukon Route runs from Whitehorse, Y.T., 110 miles to Pacific tidewater at Skagway, Alaska.

The Great Slave Lake Railway, runs from Pine Point, on the south shore of Great Slave Lake, 435 miles south of Grimshaw, Alta., where it connects with the continental rail system.

Comparisons of the freight rates between the two rail lines and between those charged in the rest of Canada are not practical, because of the varied types of service and facilities provided. It is understood that concentrates move from Pine Point on the line at a rate of 1.7 cents per ton mile. The White Pass railway is not a system that can be viewed in isolation. It is part of an integrated truck-rail-water container operation which connects the Yukon with the outside world via Vancouver, B.C. and Skagway, Alaska. Most commodities moving on this system do so under through rates which represent the combined costs of operating the various components of the overall system.

8-1.1.2 Roads

Winter roads are an important means of providing transportation North of 60. In the winter months, when temperatures are constantly below freezing point, rights-of-way can be prepared across plains, tundra, muskeg and frozen lakes. The running surface of packed snow and ice can be used by standard haulage equipment, and in this way ore may be carried south and supplies may be built up in the winter for use during the summer months. These winter roads have in most cases been constructed and operated by private contractors, and in several cases have been subsidized by government funds.

Trucking services, linking the Yukon and the southern Mackenzie District of the Northwest Territories with southern Canada, are available on a year-round basis. Completion of the Mackenzie Highway to Inuvik will provide all communities along the Mackenzie River with year-round land transport. This is expected to result in much lower freight costs and a more regular service.

Examples of truck transportation rates for various commodities from Edmonton, Alta., to Hay River, NWT, via the Mackenzie Highway, calculated on a hundred weight basis:

Vegetables	\$3.75
Frozen meats	4.22
Fresh fruits	3.75
Flour	3.21
Builders' hardware	3.37
Roofing materials	2.52

Further information may be obtained from local carriers.

8-1.1.3 Water

Movement of freight by water is a major form of transportation, particularly in the Northwest Territories. The two main water transportation systems are:

- The Mackenzie River system, originating at Hay River, NWT and Arctic coastal transportation facilities from Tuktoyaktuk, NWT. This service is provided mainly by Northern Transportation Company Limited, a Crown Corporation.
- The sea lift to the eastern Arctic and Arctic Islands undertaken annually by the Ministry of Transport.

8-1.1.4 Air

The airplane, which was instrumental in the opening of the Canadian North in the 1920s and 30s, continues to play a dominant role in resource development. Whereas the early bush pilots relied on slow and inefficient aircraft, the modern north is serviced by a variety of aircraft suited to a range of particular purposes. These aircraft vary in size from small bush planes, such as the Cessna 180, to large freighters, such as the Hercules.

Four commercial airlines now provide regularly scheduled passenger and freight service to the Yukon and the Northwest Territories.

Passenger and freight charges are generally higher North of 60 than in the rest of Canada, even

on routes which have a relatively high density of traffic. However, with the introduction of faster and more efficient equipment on many northern routes this gap has been narrowed. It may be some time

before the gap is closed completely because the costs of supporting any activity North of 60, including air transport, are determined by a variety of factors, and are usually quite high.

Table 8-1

Air Charter Rates North of 60

CARRIER	AIRCRAFT		RATES PER MILE	RATES PER HOUR
Cambridge Bay, N.W.T. Northward Aviation Ltd.	DC-3/C-47	(W)	1.75	265.00
		(S/W)	1.90	290.00
	DHC-3		1.45	160.00
	DHC-6 100 & 200 series		1.60	265.00
	300 series		1.75	275.00
	DORNIER DO28B		1.10	143.00
Cameron Bay, N.W.T. Cameron Bay Air Services Ltd.	NORSEMAN MK VI		.85	85.00
	CESSNA 180		.65	80.00
	BEECH C185		1.10	154.00
Dawson, Y.T. Trans-North Turbo Air (1971) Ltd.	DHC-2		.90	95.00
	CESSNA 185		.90	100.00
	CESSNA 185 (STOL)		.95	107.00
Fort Franklin, N.W.T. Nahanni Air Services Ltd.	CESSNA 180		.60	68.00
	CESSNA 185		.70	90.00
	HELIO COURIER		.70	80.00
Fort Providence, N.W.T. Air Providence	PA28-235		.50	70.00
	CESSNA 180		.60	75.00
Fort Simpson, N.W.T. Arctic Air Ltd.	DC-3		1.60	240.00
	CESSNA 180		.60	65.00
	CESSNA 185		.68	80.00
	BEECH C-55 BARON		.70	120.00
	PIPER PA-23		.70	120.00
	FAIRCHILD HILLER TURBO PORTER		1.10	145.00
	SIKORSKY S-55			230.00
	SIKORSKY S-55T			390.00
	VERTOL 44-A			450.00
Fort Smith, N.W.T. Buffalo Airways Ltd.	CESSNA 185 (W/S/F)		.55	65.00
	CESSNA 185 (AMPHIBIAN)		.65	78.00
	CESSNA 206		.65	78.00
	PIPER PA23-250		.70	129.00
	DHC-2		1.00	105.00
	DHC-3		1.40	150.00
	BELL 47G2			130.00
	BELL 47G4A			140.00
	ALOUETTE II ASTAZOU			260.00
Cooper & Sons Aviation Services	CESSNA 172		.50	55.00
	CESSNA 180		.50	55.00

Table 8-1 (continued)
Air Charter Rates North of 60

CARRIER	AIRCRAFT		RATES PER MILE	RATES PER HOUR
Gateway Aviation Ltd.	CESSNA 180	(W)	.50	55.00
		(S/F)	.55	60.00
	CESSNA 206	(W)	.65	80.00
		(S/F)	.65	78.00
	CESSNA 310		.70	140.00
	BEECH C-50		.60	110.00
	DHC-2		.90	95.00
	DHC-3		1.30	140.00
	DHC-6		1.50	250.00
Klondike Helicopters	BELL 47G2			130.00
	BELL 206A			250.00
	BELL 206B			255.00
	BELL 212			635.00
	HILLER FH-1100			240.00
	HILLER SL-4			170.00
	HILLER 12E			160.00
	HUGHES 500			220.00
Frobisher, N.W.T. Nordair Ltd.	737 Pass. or Pass/Cargo		3.25	1462.00
	Cargo only		3.15	1417.00
	FH227E		2.25	500.00
	TURBO MALLARD		2.00	400.00
	SHORT SKYWAN		1.80	290.00
	DC-3	(W)	1.50	200.85
		(S/W)	1.85	248.00
	DHC-6	(W)	1.80	290.00
		(S/W)	1.90	300.00
	DHC-2	(AMPHIBIANS)	1.50	150.00
		(S/W)	1.15	115.00
Hall Beach, N.W.T. Baffin Air	CESSNA 180		.90	100.00
Hay River, N.W.T. Carter Air Services Ltd.	LOCKHEED 10A		1.00	140.00
	CESSNA 185		.65	85.00
	DHC-3		1.30	130.00
	PA23-160		.50	75.00
	CESSNA 180		.55	66.00
Mackenzie Air Ltd.	PA23-250		.65	120.00
	LEAR 25		1.25	600.00
	DORNIER 28B	(F)	.90	120.00
		(W/S)	.85	120.00
Inuvik, N.W.T. Aklavik Flying Service Ltd.	CESSNA 185		.72	93.00
	DHC-2		.95	105.00
International Jet Air	DHC-2		.90	95.00
	DHC-3		1.35	145.00
	DHC-6		1.50	250.00
	CESSNA 185		.90	100.00
	DC-3		1.60	240.00
	L-188		3.00	960.00
	COMMANDER 680W		1.05	260.00

Table 8-1 (continued)

Air Charter Rates North of 60

CARRIER	AIRCRAFT	RATES PER MILE	RATES PER HOUR
Northward Aviation Ltd.	DHC-3	1.35	145.00
	DORNIER DO28B	.90	117.00
	HELIO COURIER	.65	75.00
	DHC-6 100 & 200 series	1.50	240.00
	300 series	1.60	250.00
	CESSNA 206	.65	80.00
Reindeer Air Service	BEECH D188	1.00	190.00
	CESSNA 180	.58	70.00
	CESSNA 185 "260"	.69	90.00
	CESSNA 185 "300"	.74	95.00
	PA18	.53	53.00
	PIPER AZTEC	.74	174.00
	NAVION TWIN	.69	137.00
	BEECH B50	.79	185.00
	DC-3	1.70	252.00
Trans-North Turbo Air (1971) Ltd.	DHC-2	.90	95.00
	DHC-3	1.35	145.00
	DHC-6	1.50	250.00
	COMMANDER 680W	1.05	260.00
	CESSNA 185	.90	100.00
	CESSNA 185 (STOL)	.95	107.00
Mayo, Y.T.			
Mayo Helicopters Limited	HILLER UH12E		160.00
	BELL 47G2		120.00
Trans-North Turbo Air (1971) Ltd.	DHC-2	.90	95.00
	CESSNA 185	.70	80.00
	CESSNA 185 (STOL)	.75	87.00
Norman Wells, N.W.T.			
Northward Aviation Ltd.	DHC-3	1.35	145.00
	DHC-6 100 & 200 series	1.50	240.00
	300 series	1.60	250.00
	HELIO COURIER	.65	75.00
	DC-3/C-47	1.90	290.00
	CESSNA 206	.65	80.00
Resolute, N.W.T.			
Atlas Aviation Ltd.	PIPER PA23	.80	120.00
	DHC-2	1.10	110.00
	PIPER PA18	.65	70.00
	DHC-6	2.10	340.00
	DC-3	2.10	315.00
Ross River, Y.T.			
Terri-Air (Territorial Airways) Ltd.	DHC-2	.90	95.00
	CESSNA 185	.70	75.00
Yukon Airways Ltd.	DHC-2	.90	95.00
	PA23-250	.70	140.00
	CESSNA 402A	1.00	200.00
	CESSNA 185	.70	95.00
	CESSNA 320D	.75	150.00
Sawmill Bay, N.W.T.			
Minto Airways Ltd.	BEECH D18S	1.05	140.00

Table 8-1 (continued)

Air Charter Rates North of 60

CARRIER	AIRCRAFT	RATES PER MILE	RATES PER HOUR
Tuktoyaktuk, N.W.T. Reindeer Air Service Ltd.	CESSNA 180	.65	78.00
Whitehorse, Y.T. C.P. Air	BOEING 737 Line Mileage — 2.15 + Departure CHG — 475.00		2000.00
	Ferry Mileage — 1.15 + Departure CHG — 450.00		
Globe Air Services Limited	CESSNA 150	.30	30.00
	CESSNA 170	.45	55.00
	CESSNA 172	.45	55.00
	CESSNA 180	.60	70.00
	CESSNA 185	(W/S) .60	80.00
		(F) .65	80.00
	LUSCOMBE 8F	.30	30.00
International Jet Air	DHC-2	.90	95.00
	DHC-3	1.30	140.00
	CESSNA 185	.70	80.00
	PA23-250	.70	140.00
	DC-3	1.50	225.00
	L-188	3.00	960.00
	COMMANDER 680W	1.05	260.00
Klondike Helicopters	BELL 47G2		130.00
	BELL 206A		250.00
	BELL 206B		255.00
	BELL 212		635.00
	HILLER FH-1100		240.00
	HILLER SL-4		170.00
	HILLER 12E		160.00
	HUGHES 500		220.00
Northward Aviation Ltd.	DC-3/C-47	1.90	290.00
Tintina Air Services Ltd.	CESSNA 180	.60	70.00
	CESSNA 185	.70	80.00
	CESSNA 206	.70	105.00
Trans-North Turbo Air (1971) Ltd.	DHC-2	.90	95.00
	DHC-3	1.35	145.00
	CESSNA 185	.70	80.00
	CESSNA 185 (STOL)	.75	87.00
	PA23-250	.70	140.00
	COMMANDER 680W	1.05	260.00
	BELL 47G2		120.00
	BELL 47G3B1 & 47G3B2		155.00
	BELL 206A		248.00
	BELL 206B		253.00
Yukon Airways Ltd.	DHC-2	.90	95.00
	PA23-250	.70	140.00
	CESSNA 402A	1.00	200.00
	CESSNA 185	.70	95.00
	CESSNA 320D	.75	150.00
	CESSNA 206	.80	115.00
	DHC-3	1.30	140.00

Table 8-1 (continued)
Air Charter Rates North of 60

CARRIER	AIRCRAFT	RATES PER MILE	RATES PER HOUR
Watson Lake, Y.T.			
B.C. Yukon Air Service Ltd.	DHC-3	1.30	140.00
	DHC-2	.90	95.00
	CESSNA 185	.65	80.00
	PIPER SUPER CUB	.39	36.00
Frontier Helicopters Ltd.	BELL 47G3B1		150.00
	BELL 47G3B2		150.00
	BELL 47J2		150.00
	BELL 206A		240.00
	BELL 206B		250.00
	SIKORSKY S-55		190.00
	SIKORSKY S-55T		375.00
Watson Lake Flying Services Ltd.	PIPER PA18 SUPER CUB	.40	36.00
	DHC-2	.90	95.00
Yellowknife, N.W.T.			
Aero Arctic Ltd.	BELL 47G3B		150.00
	BELL 47G3B1		160.00
	SIKORSKY S55C		275.00
	ALOUETTE II ASTAZOU		240.00
Gateway Aviation Ltd.	CESSNA 180	(W) .50	55.00
		(S/F) .55	60.00
	CESSNA 206	(W) .65	80.00
		(S/F) .65	78.00
	BEECH C-50	.60	110.00
	BEECH D-185	.90	140.00
	DHC-2	.90	95.00
	DHC-3	1.30	140.00
	DHC-6	1.50	250.00
Koenen's Air Service Ltd.	CESSNA 185	.55	75.00
Latham Island Airways	CESSNA 185	.50	60.00
	E.P. 9 PROSPECTOR	.60	60.00
Northward Aviation Ltd.	DHC-3	1.35	145.00
	DHC-6 100 & 200 series	1.50	240.00
	300 series	1.60	250.00
	CESSNA 206	.65	80.00
North West Territorial Airways Ltd.	DC-3	(W) 1.75	250.00
		(W/S) 2.00	275.00
	DC-6A/B	3.00	720.00
	BEECH 18	(W) 1.00	160.00
		(F) 1.30	160.00
	PA23-250	.80	140.00
Pacific Western Airlines Ltd.	DC-4	2.20	396.00
Ptarmigan Airways Ltd.	STINSON SR9F	.75	83.00
	PIPER AZTEC	.75	135.00
	CESSNA 185	.65	85.00
	PIPER NAVAJO	1.00	200.00
	DHC-2 MK III	1.10	150.00
Sioux Narrows Airways	GRUMMAN G-21A	1.00	125.00
	BEECH D-18	1.35	125.00
	PIPER AZTEC PA-23	.75	112.00
	NORSEMAN MK VI	1.00	125.00
Wardair Canada Ltd.	DHC-3	1.30	140.00
	BRISTOL 170	2.50	400.00
	DHC-6	1.50	250.00

Source: Rates for zones in which base is located that are on file in Fares, Rates and Services Division
Air Transport Committee, Canadian Transport Commission as of August 15, 1972.

W — Wheels S/S — Ski-Wheels S/F Ski-Floats F — Floats

Thus passenger fares and freight rates 20 to 50 per cent higher than southern Canada rates may be expected to continue in the Territories for some time to come.

Charter rates vary widely. In the case of multi-engine aircraft the rates compare favourably with those in southern Canada. Rates for DC-3 and other smaller aircraft are generally higher. Table 8-1 indicates typical charter rates for a selection of communities in the Yukon and Northwest Territories.

8-2.1 Yukon Territory

8-2.1.1 Rail-Water

When the great Klondike gold rush focused world attention on the Yukon in 1898 the horde of fortune seekers, came by steamer up the Pacific Coast of British Columbia to the Alaska Panhandle. Standing between them and the golden treasure which they sought were the forbidding Coast Range mountains. The principal routes through these mountains, and the routes which most of the gold seekers followed, were by way of the White and Chilkoot Passes.

The White Pass route remains the principal means of access from tidewater to the Yukon interior today. Since the early 1900s passengers and freight have moved over the 110-mile White Pass and Yukon Route rail line between Whitehorse and Skagway, Alaska, on the Lynn Canal. The narrow gauge railway is one of the most spectacular in the world. During its first 20 miles from Skagway it climbs in a series of twists and turns from sea level to an altitude of about 3,000 feet.

The railway's freight service is linked to dry cargo and bulk petroleum transport ships which operate between Skagway and Vancouver. Modernization of the rail-water system is continually taking place and the use of a container system since 1955 has resulted in lower freight costs.

In addition to the rail-water operations the White Pass and Yukon operates two trucking fleets, one within the Yukon and the other on the Alaska highway as well as a pipeline which runs the parallel to the railroad. The pipeline has a maximum capacity of 3,000 barrels of petroleum products per day.

The White Pass and Yukon railway also provides passenger service, particularly for the large volume of tourists arriving at Skagway by coastal vessel. During the gold rush, and for several decades thereafter, water transportation was the principal means of transport used by long-distance travellers and freight handlers within the Yukon. Fleets of sternwheelers regularly sailed the Yukon River between Whitehorse, Dawson and Mayo Landing, but during the 1950s motorized road transport moving over the rapidly-growing network of highways replaced the river system, except for small local services.

Further information on the White Pass and Yukon Route may be obtained from:

White Pass & Yukon Corporation,
12th. Floor Standard Bldg.,
510 West Hastings Street,
Vancouver 2, B.C.
Telephone 683-7221
Telex 045-613

8-2.1.2 Roads

Construction of the Alaska Highway during World War II gave the Yukon access by road to the rest of Canada, and to Alaska. The highway begins officially at Dawson Creek, B.C., and ends at Fairbanks, Alaska, a distance of 1,523 miles of which 1,220 are in Canada.

The highway crosses the southern part of the Yukon and provides an essential surface link for the vast developing area of the Territory.

Along its length such communities as Fort St. John, Fort Nelson, Watson Lake, Whitehorse and Haines Junction, rely on the highway for transport and communication.

The Alaska Highway has not so far proven an economic route for the transport of most Yukon mineral products to southern Canada and the U.S.

Another road of importance to the Yukon and also to the State of Alaska is the 160-mile gravel road joins the Alaska Highway to Haines, Alaska, on the Lynn Canal. The all-weather road is the only land link between the Alaska Panhandle and mainland Alaska. An excellent ferry system, operated by the State of Alaska, connects Haines with Prince Rupert, B.C., which is the terminus of the highway system linking northern British Columbia and the entire North American continent. The ferry system and the Haines road comprise a popular tourist route which draws many visitors during the summer months, and which can also be used during the winter, although the motorist should be warned that adequate preparation should be taken if a winter trip on the Haines road is contemplated.

In 1965 the Federal Government initiated a new Northern Roads Program which calls for an annual expenditure of \$10,000,000 for ten years. The objective is to establish a network of roads which would serve foreseeable development and communications needs in both the Yukon and the Northwest Territories. The type of road construction varies from rough trails and seasonal roads, both summer and winter, to gravel highways.

One major area development road built by the Federal Government is the new 129-mile, \$9,300,000 Ross River — Carmacks road servicing the new Anvil Mining Corporation lead-zinc mine near Ross River. The road is built to carry up to 90,000 pound loads, compared to most territorial roads which are designed to carry loads up to 75,000 pounds.

Work is proceeding on the construction of the Dempster Highway, running from the Dawson City district to Fort McPherson, N.W.T., where it will link

up with the proposed Mackenzie Highway. Sections of the Dempster highway are already open.

8-2.1.3 Air

The Yukon Territory is linked to the continental airline system through regularly scheduled passenger and freight services provided by Canadian Pacific Airlines, from Edmonton and Vancouver. Service between Whitehorse and Fairbanks, Alaska, is provided by Northern Consolidated Airlines. Juneau, the capital of Alaska, and Whitehorse, the Yukon capital are also connected by regular air services.

The Federal Ministry of Transport and the Yukon government operate the major airports in the Yukon. Scheduled and chartered air services are maintained by various companies.

Table 8-2
Commercial Air Services — Yukon Territory
 (new aircraft groups marked (*))

Point	Carrier	Class of Service	Aircraft Groups
Clinton Creek Dawson	Northward Airlines Limited	3	
	International Jet Air Ltd.	9-4	B
	Northward Airlines Ltd.	2	
		3	
Faro Mayo	Trans-North Turbo Air (1971) Ltd.	4	B
		7RF	
	Northward Airlines Limited	3	
	Mayo Helicopters Limited	4	C
Old Crow		7RF	
	Northward Airlines Limited	2	
	Trans-North Turbo Air (1971) Ltd.	4	B
		7RF	
Ross River	Northward Airlines Limited	3	
	Wien Consolidated Airlines Inc.	9-3	
	Northward Airlines Limited	3	
	Terr-Air (Territorial Airways) Ltd.	4	B
Watson Lake		7RF	
	Yukon Airways Ltd.	4	BC
		7RF	
	B.C. Yukon Air Service Ltd.	4	BC
Whitehorse		9-4	
		7RF	
	CP Air	1	
	Frontier Helicopters Ltd.	4	BC
		7RF	
	Watson Lake Flying Services Ltd.	4	BC
		7RF	
	CP Air	1	
		4	A
		9-4	
		7RF	
	Globe Air Services Ltd.	4	BC
		7FT	
		7RF	
	International Jet Air Ltd.	2	AA
		4	AA
		9-4	BC
		7RF	
	Klondike Helicopters	4	C
		7RF	
	Mid-Canada Aerial Contractors Ltd.	7AP	ABCD
		7AC	
		7AIRA	
	Northward Airlines Ltd.	4	A
		7RF	
		2	
		3	
	Northwest Survey Corporation (Yukon) Ltd.	7APS	
	Tintina Air Services Ltd.	4	C
		9-4	
		7FT	
		7RF	
	Trans-North Turbo Air (1971) Ltd.	4	BC*
		9-4	
		7RF	
	Wien Consolidated Airlines Inc.	8	
		8	
	Yukon Airways Ltd.	4	BC
		9-4	BC
		7RF	BC

Class of Service

CLASS 1: Scheduled commercial air service, being a service that is operated wholly within Canada and that is required to provide public transportation of persons, goods or mail by aircraft, serving points in accordance with a service schedule at a toll per unit of traffic;

CLASS 2: Regular Specific Point commercial air service, being a service that is operated wholly within Canada and that is required to provide, to the extent that facilities are available, public transportation of persons, goods or mail by aircraft, serving points in accordance with a service pattern at a toll per unit of traffic;

CLASS 3: Specific Point commercial air service, being a service that is operated wholly within Canada and that offers public transportation of persons, goods or mail by aircraft, serving points consistent with traffic requirements and operating conditions at a toll per unit of traffic;

CLASS 4: Charter commercial air service, being a service that is operated wholly within Canada and that offers public transportation, on reasonable demand, of persons or goods from the base declared by the Committee to be the protected base for that commercial air service at a toll per mile or per hour for the charter of an entire aircraft, or at such other tolls as may be allowed by the Committee, and includes recreational flying;

CLASS 7: Specialty commercial air service, being a service that is operated from the base specified in the licence issued for that commercial air service for any purpose not provided for by any other class of service and, without limiting the generality of the foregoing, for any of the following purposes:

- i) Aerial application and distribution (AAD)
- ii) Aerial construction (A. CONST)
- iii) Aerial control (AC)
- iv) Aerial Inspection, reconnaissance and advertising (AIRA)
- v) Aerial photography and survey (APS)
- vi) Aerial photography restricted to scenics (AP)
- vii) Flying training (FT)
- viii) Recreational flying (RF)

CLASS 8: International Scheduled commercial air service, being a service that is operated between points in Canada and points in any other country and that is required to provide public transportation of persons, goods or mail by aircraft, serving such points in accordance with a service schedule at a toll per unit of traffic;

CLASS 9-3: International Specific Point Commercial air service, being a service that is operated between points in Canada and points in any other country and that offers public transportation of persons, goods or mail by aircraft, serving such points consistent with traffic requirements and operating conditions at a toll per unit of traffic;

CLASS 9-4: International Charter commercial air service, being a service that is operated by an air carrier using

- a) Group A, B or C aircraft, or
 - b) Subject to obtaining a permit as required by Part IV, Group D, E, F, G or H aircraft;
- from the base specified in the licence issued for that commercial air service and that offers public transportation, on reasonable demand of persons or goods between places in Canada and places in any other country, at a toll per mile or per hour for the charter of the entire aircraft, or at such other tolls as may be allowed by the Committee. The groups for commercial air services based on the weight of aircraft used in the operation were completely revised when new Air Carrier Regulations were promulgated on May 5, 1972. Services issued prior to that date make reference to the old aircraft groups as shown below, and the majority of the services in the following listing refer to their old groups.

**Aircraft Groups According to Weight
Prior to Revision**

Group AA, being commercial air services with fixed or rotating wing aircraft having a maximum authorized take-off weight on wheels in excess of 35,000 pounds;

Group A, being commercial air services operated with fixed or rotating wing aircraft having a maximum authorized take-off weight on wheels in excess of 18,000 pounds but not greater than 35,000 pounds;

Group B, being commercial air services operated with fixed wing aircraft having a maximum authorized take-off weight on wheels in excess of 2,500 pounds but not greater than 18,000 pounds;

Group BRW, being commercial air services operated with rotating wing aircraft having a maximum authorized take-off weight in excess of 3,500 pounds but not greater than 18,000 pounds;

Group C, being commercial air services operated with fixed wing aircraft having a maximum authorized take-off weight on wheels not greater than 2,500 pounds; and

Group CRW, being commercial air services operated with rotating wing aircraft having a maximum authorized take-off weight not greater than 3,500 pounds". Since any licences issued subsequent to May 5, 1972 refer to the revised weight groups, and the licences predating May 1972 will gradually be corrected, the new groups pertinent to northern operations are also given here. During the transition period caution should be exercised in determining the weight of aircraft the licencees are authorized to operate.

Aircraft Group According to Weight (Period May 5, 1972)

Fixed Wing Aircraft:

Group A, having a maximum authorized take-off weight on wheels not greater than 4,300 pounds,

Group B, having a maximum authorized take-off weight on wheels greater than 4,300 pounds but not greater than 7,000 pounds,

Group C, having a maximum authorized take-off weight on wheels greater than 7,000 pounds but not greater than 18,000 pounds,

Group D, having a maximum authorized take-off weight on wheels greater than 18,000 pounds but not greater than 35,000 pounds,

Group E, having a maximum authorized take-off weight on wheels greater than 35,000 pounds but not greater than 75,000 pounds,

Group F, having a maximum authorized take-off weight on wheels greater than 75,000 pounds but not greater than 150,000 pounds.

Rotating Wing Aircraft:

Group A-RW, having a maximum authorized take-off weight not greater than 4,000 pounds.

Group B-RW, having a maximum authorized take-off weight greater than 4,000 pounds but not greater than 7,500 pounds,

Group C-RW, having a maximum authorized take-off weight greater than 7,500 pounds but not greater than 18,000 pounds.

8-3.1 Northwest Territories

8-3.1.1 Rail

The Mackenzie District of the Northwest Territories is linked by rail to the rest of Canada and the continental rail system by the Great Slave Lake Railway. The 435-mile line was built by the Federal Government at a cost of some \$80,000,000 and began operating in 1964, two years ahead of schedule.

The rail line was constructed primarily to transport ore and concentrates from the Pine Point Mines Ltd. vast lead-zinc operations on the south shore of Great Slave Lake to smelters in Trail, B.C.

In addition, the railway carries considerable freight, such as petroleum products, mine and mill supplies, foodstuffs and general merchandise for Pine Point and the northern Alberta region generally.

On the return trip, trains are also hauling agricultural and forest products from the area.

The rail line has proved a spectacular success. Production at Pine Point has exceeded expectations, and total traffic on the railway has increased substantially from the initial figure of about 8,000 carloads per year.

Along the rail line new farmland has been cleared, communities north of the Peace River are growing rapidly, and oil exploration and development firms operating in the new Rainbow Lake oilfields in northwestern Alberta are making increasing use of the railway facilities.

Additional information on the railway may be obtained from:

Great Slave Lake Railway,
Canadian National Railways,
Edmonton, Alberta.
Phone (403) 429-8110

8-3.1.2 Water

Water transport, used initially by the first adventurers in the Canadian North, remains a major form of transportation in the Northwest Territories.

The major carrier on the Mackenzie River system and along the Western Arctic Coast is the Northern Transportation Company Limited, a Crown Corporation, serving a 4,000-mile water system from the southern terminal point of Hay River, N.W.T.

The Crown company operates 29 tugs equipped with two-way radios, radar and echo sounders, two coasting vessels and 168 all-steel barges carrying deck and bulk petroleum cargo. Barges have a load capacity varying from 200 to 1,500 tons. Four new tugs and 20 1,500 ton barges will be added to the fleet for the 1973 season. These facilities will be capable of handling 500,000 tons of freight in the short summer season.

The shipping season is from early May to late September, depending on ice conditions, and company warehouses are open in April.

The Northern Transportation Company is now playing a major role in supplying oil exploration teams operating in the Mackenzie Delta and along the Arctic Coast in Alaska and Canada. The Prudhoe Bay area of Alaska, where a very large oil discovery had been made, received many of its supplies by way of this route.

Some idea of the rates charged can be gained from the following rates for Class 5 — General Freight (including oil drilling rigs) cargo from Hay River to various settlements.

Locality	Miles	Rate Per 100 lbs. \$	Cost Per Ton/mile (cents)
Aklavik	1,025	2.60	5.1
Arctic Red River	925	2.47	5.3
Cambridge Bay	1,907	7.61	8.0
Cape Parry	1,372	4.68	6.8
Coppermine	1,760	7.02	8.0
Fort Franklin	617	3.45	11.2
Fort Good Hope	711	2.04	5.7
Fort Norman	540	1.69	6.3
Fort Simpson	238	1.30	10.9
Fort Wrigley	390	1.56	8.0

Locality	Miles	Rate Per Ton/mile \$	Cost Per 100 lbs. (cents)
Holman Island	1,520	7.02	9.2
Inuvik	1,042	2.60	5.0
Norman Wells	591	1.69	5.7
Port Radium	787	4.88	12.4
Sachs Harbour	1,391	4.89	7.0
Spence Bay	2,257	9.69	8.6
Tuktoyaktuk	1,122	2.93	5.2

Source: Northern Transportation Company Limited
Freight Tariff (April 1973).

Acceptance of freight:

All shipments are received upon and subject to the terms of current published tariffs and bill of lading of the Company which can be seen in the Company's offices at 10040 - 105th Street, Edmonton, Alta.; Hay River, N.W.T., and Waterways, Alta.

Storage:

Freight is stored free of charge while awaiting shipment, but at the owner's risk of fire, flood or frost.

Railway, truck charges:

All railway, truck and other transportation charges must be paid to Hay River, N.W.T. or Waterways, Alta. Shippers must advise the company receiving terminals if shipments are "Prepaid to Destination".

C.O.D. Shipments:

With the exception of refrigerated products the Company will carry C.O.D. shipments provided they are delivered to the Company, all charges prepaid (not including the Company's own charges). The Company must be advised in writing, prior to the receipt of the shipment, the amount of C.O.D.

Bulk Oil Movement:

Space for bulk oil shipments is available on tows leaving Hay River, N.W.T., Norman Wells, N.W.T., and Waterways, Alta.

Packing, Crating:

All cases, crates or containers should be of strong construction, and contents well packed, otherwise cargo will be carried at owner's risk. The shipper will be considered the owner until cargo is delivered to the consignee.

Marking:

Packages should be clearly marked with numbers on the left and weights on the right, and should be individually marked.

Weights:

All weights must be accurate gross weight, and not approximated.

Refrigeration:

Refrigerated service, consisting of three trips per season, is provided along the Mackenzie River from Hay River, N.W.T. to Tuktoyaktuk, N.W.T. for vegetables, fresh fruits and frozen meats. Shippers must reserve space well in advance of sailing dates.

For further details and complete information contact:

Northern Transportation Company Limited,
General Office,
10040 - 105th Street,
Edmonton, Alberta.
Telephone: (403) 422-2161
Telex: 037-2480

In addition to Northern Transportation Company four private carriers are licensed by the Water Transport Committee of the Canadian Transport Commission to operate on the Mackenzie River. They are as follows:

Kaps Transport Limited, Edmonton, Alta.

Equipment: 4 Tugs, 21 Barges

To transport goods on the Mackenzie watershed to any point adjacent and/or accessible to, exploration drilling sites, pipeline rights of way, building and construction sites; including the movement of goods off the Mackenzie and up other routes which would be navigable, such as the Liard and other rivers, and,

To transport goods by water from ports and places on the Mackenzie River as defined in the Transport Act, that is, all rivers, streams, lakes and other waters within the watershed of the Mackenzie River.

**Streeper Brothers Marine Transport Ltd.,
Dawson Creek, B.C.**

Equipment: 2 Tugs, 5 Barges

To transport goods by water from ports and places on the Fort Nelson and Liard Rivers to ports and places on the Mackenzie and from the Mackenzie River to the Liard and Fort Nelson Rivers, and,

To transport goods by water from ports and places on the Mackenzie and from the Mackenzie River to Liard and Fort Nelson Rivers.

Cooper Barging Services Ltd., Fort Nelson, B.C.

Equipment: 2 Tugs, 4 Barges

Licence to transport goods by water between all ports and places within the watershed of the Mackenzie River.

Lindberg Transport Limited, Fort Simpson, N.W.T.

Equipment: 1 Tug, 1 Barge

Licence to provide a weekly barge service to transport goods by water from ports and places on the Mackenzie River watershed between Fort Providence, Northwest Territories and Fort Simpson, Northwest Territories.

Table 8-3**Approximate Shipping Costs for Dry Cargo
from Montreal to the Eastern Arctic**

(\$/ton)

	1972	1973		1972	1973
Repulse Bay			Eskimo Point		
Igloolik	\$185.	\$283.	Whale Cove		
Hall Beach			Rankin Inlet		
			Chesterfield		
			Inlet	\$126.	\$226.
			Baker Lake		
			Coral Harbour		
			Cape Dorset		
			Lake Harbour		
			Port Burwell		
Frobisher Bay	\$125.	\$176.			
Pangnirtung	\$125.	\$192.			
Resolute Bay					
Arctic Bay					
Pond Inlet	\$160.	\$230.			
Clyde River					
Broughton					
Island			Grise Fiord	\$160.	\$375.

For information on the current rates and any further
information required contact:

Cargo Division,
Canadian Coast Guard,
Ministry of Transport,
Place de Ville, Tower "C",
OTTAWA, Ontario K1A 0N5

8-3.1.3 Roads

In April, 1972 the Federal Government announced that it would undertake the completion of the Mackenzie Highway. Construction from the Alberta-N.W.T. border to Fort Simpson was already completed and work had already begun on the 33 mile stretch south from Inuvik. Final construction would run from mile 296 at Fort Simpson, northwest, joining eventually with work completed at the north end.

It is also planned to extend the highway from Inuvik to Tuktoyaktuk, at a later date. Total length of the highway would then be 1,049 miles.

The highway will run along the east side of the Mackenzie River with the exception of the 346 miles from the Alberta-N.W.T. border to Camsell Bend.

The Mackenzie Highway forms part of the northern roads network included in the Territorial Roads Policy approved by the government in 1965. It commences at the Alberta-N.W.T. border connecting on the south end with the Alberta Provincial Highway route 35 at the 60th. parallel. Construction of the section to the Mackenzie River opposite Fort Providence was completed in 1958 as a part of the road system servicing Hay River and Yellowknife. Construction of the section (179 miles) between Fort Providence and Fort Simpson was completed in 1970. Construction of the section from Inuvik 33 miles south towards the Dempster Highway, was commenced on a three-year contract in 1971.

There remained, therefore, as of April, 1972, approximately 635 miles of new Mackenzie Highway to be completed, exclusive of the 33 miles currently under contract.

The Department of Indian Affairs and Northern Development has the over-all responsibility for the project which takes into consideration financing, construction schedules and major social and environmental questions. The N.W.T. government has considerable responsibility for the project in relation to sociological aspects, employment and training of local residents. Other federal departments also have significant responsibilities especially the Department of Public Works which as prime contractor is responsible for design and construction under the monitoring of the Technical Services Branch of DIAND.

The Mackenzie Highway Committee, composed of members from the Federal and N.W.T. governments has, in conjunction with the Mackenzie Highway Project Manager, full directional responsibility. The Project Manager and in turn the Committee, is advised by the five Mackenzie Highway Working Groups: Environmental, Economic, Employment and Local Impact, Technical and Granular Materials. In addition, an Interdepartmental Environmental Committee chaired by an Assistant Deputy Minister of the Department of the Environment, has been established as an independent monitor of all environmental concerns relating to the highway.

Trucking rates along the Mackenzie Highway are slightly higher than those in the neighboring province of Alberta.

8-3.1.4 Air

The Northwest Territories are currently served by three commercial airlines connected to the south.

Pacific Western Airlines flies from Edmonton to Fort Smith, Yellowknife, Inuvik, Cambridge Bay, Norman Wells, Wrigley, Resolute Bay and other points in the Western Arctic.

Transair operates from Winnipeg to Churchill, Manitoba and points in the Eastern Arctic.

Nordair flies from Montreal to Cape Dyer, Frobisher Bay, Fort Chimo and Resolute Bay.

Other commercial air carriers operate a variety of scheduled and charter air services throughout the territory, as shown in the following listing. The classification of these services is the same as that outlined in section 8-2.1.3.

Table 8-4

Commercial Air Services — Northwest Territories

(New aircraft Groups marked (*))

Point	Carrier	Class of Service	Aircraft Groups
Aklavik	Northward Aviation Limited	2	BD *
Albert Edward Bay	Arctic Outpost Camps Limited	4 7RF	A
Arctic Bay	Kenting Atlas Aviation Limited	3	BC
Arctic Red River	Northward Airlines Limited	2	B
Baker Lake	Transair Limited	2 3	
Broughton Island	Nordair Ltd.	3	AB
Cambridge Bay	Northward Airlines Limited	3 7RF	AB AB
	Northwest Territorial Airways Ltd.	3	
	Pacific Western Airlines Ltd.	2	A
Cameron Bay	Cameron Bay Air Services Ltd.	4 7RF	B
Cape Dorset	Austin Airways Ltd.	2	
	Nordair Ltd.	3	AB
Cape Dyer	Nordair Ltd.	2 3	AB
Chesterfield Inlet	Transair Ltd.	3	
Clyde River	Nordair (Arctic) Ltd.	3	AB
Colville Lake	Northward Airlines Limited	2	BD *
	Reindeer Air Service Limited	3	BD *
Coppermine	Northward Airlines Ltd.	3	AB
	Northwest Territorial Airways Ltd.	3	
	Pacific Western Airlines Ltd.	3	A
Coral Harbour	Nordair Ltd.	3	AB
	Transair Ltd.	2 3	
Cullaton Lake	Transair Ltd.	3	
Eskimo Point	Transair Ltd.	3	
Eureka	Bradley Air Services Limited	4 7RF	BCD * BCD *
	Kenting Atlas Aviation Ltd.	3	BC
Fort Franklin	Nahanni Air Services Ltd.	4 7RF 9-4	B B B
	Northward Airlines Ltd.	2	BD *
	Reindeer Air Service Ltd.	3	BD *
Fort Good Hope	Northward Airlines Ltd.	2	BD *
	Reindeer Air Service Ltd.	3	BD *
Fort Liard	Arctic Air Ltd.	3	B
Fort McPherson	Northward Airlines Ltd.	2	BD *
Fort Norman	Northward Airlines Ltd.	2	BD *
	Reindeer Air Service Ltd.	3	BD *
Fort Providence	Air Providence	4	B
Fort Reliance	Ptarmigan Airways Ltd.	3	BC
Fort Resolution	Pacific Western Airlines Ltd.	2	A
Fort Simpson	Arctic Air Ltd.	3 4 7RF	B B
	Nahanni Helicopters Ltd.	4 7RF	BC *
	Pacific Western Airlines Ltd.	1	

Table 8-4

Commercial Air Services — Northwest Territories

(New aircraft Groups marked (*))

Point	Carrier	Class of Service	Aircraft Groups	
Fort Smith	Buffalo Airways Ltd.	4 7RF 7AC	BC	
	Cooper & Sons Aviation Services	4 7AIRA	C	
	Gateway Aviation Ltd.	4 7RF	B	
	Klondike Helicopters	4 7RF	C	
	Pacific Western Airlines Ltd.	1 2	A	
Frobisher	Nordair Ltd.	2 3 4 7RF 9-3	AB AB AA	
Gjoa Haven	Northward Airlines Ltd.	3	AB	
Grise Fiord	Kenting Atlas Aviation Ltd.	3	BC	
Hall Beach	Baffin Air	4 7RF	B	
	Nordair Ltd.	2 3	AB	
	Transair Ltd.	3		
	Hay River	Carter Air Services Ltd.	4 7RF	B
		Mackenzie Air Ltd.	4 7RF	BC
Pacific Western Airlines Ltd.		1		
Holman Island	Northward Airlines Ltd.	3	AB	
	Northwest Territorial Airways Ltd.	3		
Hope Lake	Northwest Territorial Airways Ltd.	3		
	Pacific Western Airlines Ltd.	2	A	
Igloodik	Nordair Ltd.	3	AB	
Inuvik	Aklavik Flying Service Ltd.	4 7RF	B	
	International Jet Air Ltd.	2 7RF	AA AA	
	Northward Airlines Ltd.	2 3 4 9-4 7RF	BD* AB	
	Pacific Western Airlines Reindeer Air Service Ltd.	1 3 4	BD* AA BC	
		9-4 7RF 7AIRA		
	Trans-North Turbo Air (1971) Ltd.	4 7RF	B	
	Isachsen	Kenting Atlas Aviation Ltd.	3	BC
Johnson Point	Northward Airlines Ltd.	3	AB	
Lady Franklin	Northwest Territorial Airways Ltd.	3		

Table 8-4

Commercial Air Services — Northwest Territories

(New aircraft Groups marked (*))

Point	Carrier	Class of Service	Aircraft Groups
Lake Harbour	Nordair Ltd.	3	AB
Magda Lake	Kenting Atlas Aviation Limited	3	BC
Melville Island	Kenting Atlas Aviation Ltd.	3	BC
	Northwest Territorial Airways Ltd.	3	
	Pacific Western Airlines Ltd.	3	A
Mould Bay	Kenting Atlas Aviation Ltd.	3	BC
Norman Wells	Northward Airlines Ltd.	2	BD*
		4	BD*
		7RF	
	Pacific Western Airlines Ltd.	1	
Nueltin Lake	Transair Ltd.	3	
Pangnirtung	Nordair (Arctic) Ltd.	3	AB
Pelly Bay	Nordair (Arctic) Ltd.	3	AB
	Northward Airlines Ltd.	3	AB
Pond Inlet	Kenting Atlas Aviation Ltd.	3	BC
Port Radium	Northwest Territorial Airways Ltd.	3	
Rankin Inlet	Transair Ltd.	2	
		3	
Repulse Bay	Transair Ltd.	3	
Resolute	Kenting Atlas Aviation Ltd.	3	BC
		4	ABC
		7RF	
		7AP	
		7APS	
	Nordair Ltd.	2	
	Pacific Western Airlines Ltd.	3	A
Resolute Island	St. Félicien Air Service Ltée	3	BD*
Sachs Harbour	Northward Airlines Ltd.	3	AB
Sawmill Bay	Minto Airways Ltd.	4	B
		7RF	
	Northwest Territorial Airways Ltd.	3	
Snowdrift	Ptarmigan Airways Ltd.	3	BC
Spence Bay	Northward Airlines Ltd.	3	AB
Strathcona Sound	Kenting Atlas Aviation Ltd.	3	BC
Tavani	Transair Ltd.	3	
Tuktoyaktuk	Northward Airlines Ltd.	2	BD*
		3	
	Reindeer Air Service Ltd.	4	B
		7RF	
Whale Cove	Transair Ltd.	3	
Wrigley	Pacific Western Airlines Ltd.	2	A

Table 8-4

Commercial Air Services — Northwest Territories

(New aircraft Groups marked (*))

Point	Carrier	Class of Service	Aircraft Groups
Yellowknife	Aero Arctic Ltd.	4	BC
		7AAD	BC
		7AIRA	BC
		7APS	BC
		7AP	BC
	Gateway Aviation Ltd.	4	B
		7RF	
	Koenen's Air Service Ltd.	4	B
		9-4	
		7RF	
	Latham Island Airways	4	B
		7RF	
	Northward Airlines Ltd.	3	AB
		4	B
		7RF	
	Northwest Territorial Airways Ltd.	3	
		4	AB
		9-4	
		7RF	
		7AC	
	Pacific Western Airlines Ltd.	2	A
		4	A
		7RF	
		7AIRA	
	Ptarmigan Airways Ltd.	3	BC
		4	B
		9-4	B
		7RF	
	Reindeer Air Service Ltd.	3	BD*
	Sioux Narrows Airways	4	BD*
		7RF	
		3	
	Transair Ltd.	3	
	Wardair Canada Ltd.	4	AA & AB
		7RF	
		7AC	

Source: *Directory of Canadian Commercial Air Services*,
Air Transport Committee, Canadian Transport Commission,
(February 15, 1973).

In the Eastern Arctic, the Ministry of Transport is the coordinator for freight movements during the summer Sealift Operations. Through the Canadian Coast Guard the Ministry organized and supervises the sealift operations, provides ice breaker escort and support services as required, and makes arrangements for the ships needed to transport the freight.

Dry cargo rates into the Eastern Arctic vary considerably according to the location of the settlements and the commodities involved, and can also fluctuate markedly from year to year depending on the influence of the many factors affecting costs of marine transport.

Table 8-3 shows the average rates charged in 1972 from Montreal to each settlement, and the significantly increased rates charged in 1973 which reflected the greater worldwide demand for ships, and concurrent increased in many of the cost factors affecting marine transport.

North of 60

Data



Index

Data

- 9.
 - a) people
 - b) goods and services
 - c) territorial government
 - d) municipalities
 - e) geography and climate
 - f) communications
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People "A"

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Revised January, 1974

People

9A-1.1 General

The human resource is the key to the successful development of all the natural resources North of 60. Like the other resources, the human resource has barely been developed. The Federal Government, through the Department of Indian Affairs and Northern Development, and other departments and agencies, considers the full participation of the indigenous peoples in the economic life of the Territories a main objective in the development of the northern regions.

The percentages of wage earners and experienced workers in the potential labour force of the Territories is significantly lower for the indigenous people than for the other ethnic groups, but in recent years, with the development of new education facilities and employment opportunities, these percentages are increasing.

The proportion of indigenes in the work force of Territorial industries is relatively low. The reasons for the lower labour force participation rates of indigenes cannot be simply stated but certain problem areas can be discerned. Probably the most important of these interrelated areas are:

- a) the educational background of the indigenous population;
- b) the labour force requirements and attitudes of the industry involved;
- c) the social problems of indigenes when they are placed in an industrially-oriented community; and
- d) housing.

An added important factor affecting the labour force generally is the population shift within the Territories. The economic and sociological climate has in the past resulted in sudden changes in the way of life of the indigenes. However, as the economy and the sociological environment becomes more stabilized, with the development of industry, permanent housing and community amenities, the participation of indigenes in the labour force will show a positive change.

9A-1.1.1 Education

A wide range of educational opportunities is provided for residents of the Yukon and the Northwest Territories. Most viable communities now have schools which teach at least the elementary grades. In larger communities the grade levels are rapidly being increased to the Gr. IX level and the major population centres offer complete secondary and many vocational and commercial options. It is estimated that virtually all school-age children are now enrolled.

Vocational and/or occupational courses are provided in schools at Whitehorse, Fort Smith, Yellowknife, and Frobisher Bay. The Churchill Pre-Vocational School which has been operated at Fort Churchill, Manitoba, since 1964 will be closed in 1973 and students will be accommodated in facilities within the N.W.T.

Adult education are now offered in numerous

northern communities and these are experiencing ever increasing enrollment patterns — especially from the Eskimo and Indian population.

Both territories provide for On-the-Job Training and Apprenticeship Training Programs. Academic upgrading classes are also offered for those who require or wish to improve their academic standing.

Qualified territorial residents may continue their education in outside universities and institutes of technology. A system of grants and bursaries are offered to such students since there are no post-secondary education facilities in the Territories.

Both Territorial governments are striving to improve the effectiveness of their educational programs. Areas receiving attention include the development of a northern curriculum, instruction in the vernacular languages, provision of more vocational and occupational courses, the extension of pre-school programs and a further expansion of the adult education program.

This range of education programs has been very well accepted by industrial and governmental employers, and demand for program graduates has exceeded the available supply. Thus it seems very likely that the young indigenous population is becoming a significant potential source of labour for industries in the Territories and other parts of Canada. For "older" indigenes (this group includes relatively uneducated indigenes between 20 and 30 years of age), programs providing upgrading and retraining courses are helping the indigenous group to achieve greater labour force participation.

The Territorial governments, are working towards improving the effectiveness of the various educational programs. Areas which are being given particular attention include:

- a) Expansion of the basic education system to encompass all school age children;
- b) The provision of pre-school courses (e.g., in language and basic knowledge) which help to prepare indigenes for schooling;
- c) The extension of adult education programs, including language upgrading courses;
- d) The extension of Occupational Training for Adults programs;
- e) Encouragement of more indigenes to take advantage of present educational opportunities.
- f) Mobility and relocation assistance;
- g) The provision of more vocational and advanced education opportunities — this includes a detailed assessment of the type of programs required;
- h) Involvement of Territorial employers in planning the type of vocational training required.

9A-1.1.2 Requirements and Attitudes

There is an increasing tendency for most industries to require the services of fewer unskilled labour resources, and the mining industry is no exception to this tendency. This tendency not only severely limits the opportunities for unskilled workers, but it also limits opportunities for casual workers. Positions calling for skilled and semi-skilled workers which generally involve work on a day-to-day basis may be available.

With the exception of the younger, more educated group, there are few indigenous labour groups possessing the skills and aptitudes required by the modern enterprise. Few older indigenes can be classified as skilled or semi-skilled workers and some members of this group prefer to work on a casual day-to-day basis. For such workers employment opportunities are greatly affected by the employment attitudes of the mining company concerned. If the company displays patience and understanding some progress can be made, for experience has shown that it may take some time for indigenous workers to become accustomed to industrial conditions and to learn new skills and responsibilities. However, if indigenes are given time to build up physical strength, adjust socially, and learn job skills, initial problems can be markedly decreased. These initial problems are complex and their solution requires close co-operation between company and government personnel. For example, companies cannot be expected to accept continued absenteeism and low-productivity from their employees, yet in the long run companies stand to gain from employing more indigenes — through lower hiring costs and turnover rates.

Currently, governmental agencies are involved in close liaison with Territorial companies in such areas as:

- a) Determination of the labour requirements of the companies;
- b) Initiation and maintenance of contact with indigenes who could conceivably meet the companies labour requirements;
- c) Arranging and co-ordinating of required training programs — on the job and/or at specific training centres;
- d) Investigation of the need for payments to the company (per worker) during the first few months of employment;
- e) Checking the physical fitness and dietary need of indigenes during the initial period of employment;
- f) Facilitating the integration of indigenes into the community, for example, by planning recreation programs, and by conducting home management programs.

With close co-operation between government and industry, there could be a significant increase in the employment of the older and relatively uneducated indigenes. The problems associated with the employment of the younger (generally better educated) indigenes are not as great, but here again co-operation is necessary to ensure that the potential of these labour resources is fully realized.

9A-1.1.3 Social Problems

Better education alone does not ensure that indigenes will be employed by northern employers. Many of these people (even in the younger generation) retain strong bonds with their traditional environment and complete acceptance of the industrial way of life cannot be expected immediately. The social integration and acceptance of indigenes will only occur gradually but the type of government/industry co-operation discussed above should help to alleviate transition problems.

9A-1.1.4 Housing

Housing is a very important factor in the social integration and continued employment of indigenes. Experience has shown that married male indigenes are often very reluctant to leave their wives and families for more than a few weeks at a time. This is also a problem with non-indigenous married males, but it appears to be much more serious in the case of the indigenes. To help overcome the problem, the Department and the Territorial government operate several programs whereby houses are provided for indigenous people on a variety of bases (grant, purchase, rental).

9A-2.1 Yukon

9A-2.1.1 History

The Indians of the Yukon Territory divide into two principal groups; the Déné or Athapaskans in the interior, and a northern fringe of the Tlingit tribe who live in the south-western part of the Territory. The Déné people are again divided. The Loucheux tribe is found primarily in the Peel and Porcupine River areas with their main settlement at Old Crow. A second tribe, made up of Kutchin Indians, live in the Yukon River watershed to the south. The Kutchins are often referred to as the "Sitck" Indians, a term meaning "of the forest". In addition to the Dene and Tlingit groups, a few Nahanni Indians are found in the southeastern corner of the Yukon Territory near Frances Lake and the streams draining into the Liard River.

Archaeological remains indicate that the short Arctic Coast of the Yukon (about 135 miles) once supported a fairly substantial Eskimo population. There are no Eskimo communities on this coast now; most of the Eskimos found in this area are travelling along the coast to or from the Mackenzie Delta or Alaska.

Before the arrival of Europeans in the Yukon, the natives depended entirely on fishing and hunting for their livelihood. As elsewhere, their way of life has changed considerably following white settlement in the area. This is particularly true in the southern Yukon and along the Yukon River where the younger generations of Indians have adopted "white" ways very rapidly.

The first available census figure in 1895 shows an estimated population of 2,600 Indians in the Yukon. In 1912, when the provincial and territorial boundaries assumed their present pattern, population was 1,839. In 1929, the Indian population sank to a record low of 1,264 and then it began to increase at a steady rate. In July 1965, the population stood at 2,460, just slightly less than the figure for 1895.

There appears to have been little or no "white" penetration of the Yukon Territory until the middle of the 19th century. Although the Russians had been exploring and exploiting Alaska since its discovery in 1741, they had penetrated inland only 300 miles from the Bering Sea by 1838, some 600 miles from what was to become the Yukon border.

Fur was the initial attraction to the Yukon, but gold quickly displaced it. Although the presence of gold was suspected, it was not until 1873 that prospectors began arriving in the Yukon in significant numbers. Many of the earlier arrivals came from California when the strike of '49 had passed. Some entered the Yukon from the north up the Yukon River from Alaska. Others coming in from the south were the first to cross the Chilkoot Pass in 1878. With the influx of miners, of whom there were several hundred by 1884, many of the fur posts turned to trading in prospectors' supplies, and a water supply route was established by river steamers on the Yukon River. In August 1896, the famous Klondike strike was made on Bonanza Creek. Thousands of gold seekers poured into the area, and Dawson City, at the junction of the Klondike and Yukon Rivers, quickly grew into a mining, and trading community of some 25,000 people and captured a colorful place in Canadian history.

By 1901 the total population of the Yukon was over 27,000 and of this total about 3,000 or nearly 12 per cent were Indians. Nearly all of the 24,000 whites were in the vicinity of Dawson City and in search of gold. However, by 1902 and 1903, the successful began to leave and by 1910 the population of the Yukon had fallen to 8,512.

For the next 35 years, until the mid-years of World War II, the population fluctuated between 4,000 and 5,000. During this period the Indian population accounted for one-third of the total. From 1941 to 1951 the population doubled from 4,194 to 9,906. This impressive increase resulted from the influx of construction workers and military personnel required to build and maintain national defence installations and communications facilities.

The upward trend continued after the war and during the twenty-year period 1951-71 the population doubled to 18,388. This growth can be attributed mainly to increased exploitation of the Territory's natural resources and to expanded government activity.

9A-3.1 Northwest Territories

9A-3.1.1 History

Before the white man arrived in the Northwest Territories the Indians and Eskimos had evolved successful cultures of seasonal nomadism based on hunting and fishing. Mammals, birds and fish provided food, clothing, fat and oil for heating and lighting, implements and even weapons for the hunt. That state of existence prevailed, more or less unaltered, for four to five thousand years with the Eskimos inhabiting the Arctic coastal areas and treeless tundra and the Indians the sub-Arctic spruce forests.

There were several tribes of Indians chiefly of the Athapaskan linguistic stock. In the east, the Chipewyans ranged from Hudson Bay to Lake Athabasca; to the northwest there were the Yellow-knives, the Dogribs, the Hare and the Bear Lake Indians. The Slaves and Loucheux occupied the Mackenzie River Valley. These tribes consisted of

bands of varying size under the leadership of one strong man or chief. They roamed in small bands, often camping for several weeks or even months at a fishing area or caribou crossing. The Athapaskan tribes made frequent trips into the tundra during the summer and fall to hunt caribou and muskoxen, going as far as the Arctic coast in the vicinity of Coronation Gulf.

The Eskimos, with the exception of a group in the interior of Keewatin, had developed a primarily coastal culture. They were divided into small family groups and moved with the game resources of their region. Usually, they hunted in the coastal areas but in summer they made special hunts inland for caribou and muskoxen. They also made occasional trips to the vicinity of the tree-line to cut wood for sledge runners, tools and implements.

Although their hunting areas were adjacent and their way of life similar, the Indians and Eskimos remained apart and seldom met except in strife. There was little or no cultural exchange and no intermarriage between the two races.

The European explorers of the 16th, 17th and 18th centuries were the first white men to contact the Indians and the Eskimos. Although encounters between explorers and northern natives were numerous during that period, they did not result in much change in the traditional native way of life. The explorers were followed by the whalers and the fur traders and they, in turn, by the missionaries, Royal Canadian Mounted Police, and northern pioneers. Small settlements grew up around the trading posts and missions along the main waterways and introduced a new way of life to the North.

It was the fur trade that had the greatest impact on the northern peoples. The Indians and Eskimos were encouraged to trap fur bearers which previously had little use and as a result they spent less time at their traditional hunting pursuits. The rifle enabled them to kill game more efficiently but larger dog teams were necessary for winter travel on their new traplines. These developments made excessive demands on the game resources over wide areas.

At the same time the isolated trading posts gradually became permanent settlements as Indian or Eskimo families settled near the source of trade goods and were attracted by the white man's activities. Many of the settlements became centres of transportation and jumping off spots to the interior for trappers, prospectors and government research parties.

By 1900 there were 13 settlements in the Mackenzie Valley connected by water transportation; in the eastern Arctic there were only a few isolated trading posts. When the present boundaries of the Northwest Territories were set in 1912, the population was over 6,000 persons of which all but a small proportion were Indians and Eskimos.

In the following fifty years there was a steady increase in the population of the Territories. The growth in the Indian and Eskimo populations during that period resulted from a fairly rapid rate of natural increase, while the growth in the white

population of the Territories was due mainly to immigration. People north in response to various resource developments and government programs. The number of whites in the Territories was less than 1,000 in 1921, but had more than doubled by 1941. The fur resources and the discovery of oil at Norman Wells attracted an influx of whites in the 1920s. Discovery of gold at Yellowknife and pitch-blend at Great Bear Lake in the 1930s brought increasing numbers to the Mackenzie District and led to the establishment of Federal Government administrative centres. In the 1940s activities

connected with the war the Canol pipeline, airfield construction, and uranium mining at Great Bear Lake, spurred additional immigration. In the decade preceding the 1961 Census the total territorial population increased by 43 per cent, the white population alone by 83 per cent. This impressive growth in the white population resulted from greatly expanded government activities in the North, mainly defence and social programs, and extensive construction and road building. By 1971 the population had increased to 34,807.

Table 9A-1

Total Population of the Territories, 1901 - 1971

	1901	1911	1921	1931	1941	1951	1961	1966	1971
N.W.T.	20,129	6,507	8,143	9,316	12,028	16,004	22,998	28,738	34,807
Yukon	27,219	8,512	4,157	4,230	4,914	9,096	14,628	14,382	18,388
TOTAL	47,348	15,019	12,300	13,546	16,942	25,100	37,626	43,120	53,195

Source Statistics Canada

Table 9A-2

Population by Specified Age Groups in the Territories 1966-1971

	Yukon				Northwest Territories			
	June 1 1966	June 1 1971	1966	1971	June 1 1966	June 1 1971	1966	1971
Total	14,382	18,388	100	100	28,738	34,807	100	100
0-4	2,124	2,114	14.8	11.5	5,232	5,477	18.2	15.7
5-9	1,848	2,291	12.8	12.5	4,051	5,388	14.1	15.5
10-14	1,437	1,963	10.0	10.7	2,921	4,077	10.2	11.7
15-19	1,017	1,441	7.1	7.8	2,454	2,993	8.5	8.6
20-24	1,116	1,848	7.8	10.1	2,470	3,432	8.6	9.9
25-34	2,339	3,466	16.2	18.8	4,475	5,523	15.6	15.9
35-44	2,016	2,261	14.0	12.3	3,131	3,549	10.9	10.2
45-54	1,240	1,570	8.6	8.5	1,990	2,291	6.9	6.6
55-64	732	916	5.1	5.0	1,229	1,322	4.3	3.8
65-69	216	224	1.5	1.2	324	324	1.1	.9
70+	297	294	2.1	1.6	461	431	1.6	1.2
18 & over	8,335	11,109	58.0	60.4	15,091	18,025	58.0	51.8
21 & over	7,762	10,314	54.0	56.1	13,588	16,225	54.0	46.6

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Goods and Services "B"

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Table

9B-1 Commercial Energy Producing Installations
in the Yukon and N.W.T.

Revised January, 1974

9B-1.1 Consumer Prices

The cost of living in northern Canada varies widely, and ranges roughly from about 20 to 50 per cent higher than in the south.

For example, Statistics Canada in 1968 and 1969 conducted a survey of comparative price levels encountered by Federal Government employees in various northern settlements. The results are as follows:

Date of Survey, September 1968 Montreal = 100

Location	Food	Index Level Supplementary Goods and Services
Frobisher Bay	135	125
Cape Dorset	145	135
Pangnirtung	135	135
Broughton Island	145	145
Igloolik	135	145
Pond Inlet	145	145

Date of Survey, March 1969 Edmonton = 100

Yellowknife	115	125
Hay River	115	125
Fort Smith	115	125
Fort Simpson	125	125
Inuvik	145	135
Tuktoyaktuk	165	145
Fort McPherson	165	145
Aklavik	165	135

Date of Survey, October 1969 Vancouver = 100

Dawson City, Y.T.	145	125
Haines Junction, Y.T.	145	125
Mayo, Y.T.	145	125
Watson Lake, Y.T.	125	125
Whitehorse, Y.T.	125	125

Following is an estimation of the price differences in the Yukon and Northwest Territories, compared with southern Canada. Southern Canada is used as the base for comparison at 100%.

The levels shown are typical of the differences existing in the more accessible regions of the two Territories. In the far northern mainland and the Arctic Islands, the differences may be twice as great. Figures are based on 1966 prices, the latest figures available.

	Southern Canada	Territories
Food	100	125
Tobacco and alcoholic beverages		
Tobacco products and smokers' accessories	100	100
Alcoholic beverages excluding beer	100	110
Beer	100	200

Clothing and personal furnishings

Men's and boys' clothing	100	110
Women's and children's clothing	100	110
Footwear	100	110
Laundry and dry cleaning	100	110
Other	100	110

Shelter

100	130
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Household operation

Fuel Oil	100	180
Electricity	100	200
Gasoline	100	125
Telephone	100	120
Furniture	100	110
Home Furnishing	100	110
Appliances, radios and television sets	100	110
Other	100	110

Transportation

Streetcar, railway and other fares	100	110
New automobiles, used automobiles and house trailers	100	100

Automotive operating expenses

100	130
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Personal and medical care and death expenses

Medical and dental care	100	110
Hospital care, private duty nursing, accident and sickness insurance, prepaid medical care	100	110
Other	100	110

Miscellaneous

Motion picture theatres	100	100
Newspapers and magazines	100	110
Net expenditure abroad	100	100
Other	100	110

9B-1.1.1 Taxes

Generally, residents of the Yukon and Northwest Territories are free of many of the taxes paid by Canadians living in the provinces.

Property taxes, including their counterpart (occupancy or rental taxes) which are the major financial base for all municipal or county activities were levied in seven communities in the Northwest Territories in 1972.

The mill rates in these communities are as follows, as of 1972:

YELLOWKNIFE

General 30.3

School 32.7

Business 15.15

INUUVIK
General 27
School 15
No business tax

PINE POINT
General 44.69
School 15
No business tax

FORT SMITH
General 40
School 15
No business tax

HAY RIVER
General 26
School 15
Business tax 13

FORT SIMPSON
General 27.38
School 15
No business tax

NORMAN WELLS
General 31.5
School 15
No business tax

In the Yukon Territory there is a universal mill rate of 12 mills general and 16 mills education, except in the capital city of Whitehorse where the general mill rate is 21 mills and education 16 mills.

A full range of municipal services are provided in all settlements through the Territorial Government.

Provincial sales taxes which are levied in most Canadian provinces are not levied in the two Territories.

Less tax is paid to operate motor vehicles in these regions. Motorists in the Northwest Territories for example are taxed 14 cents per gallon for gasoline and in the Yukon Territory the fuel tax is 14 cents, or one-half to one-third less than the tax levied in the provinces.

Licence fees for most motor vehicles are considerably less than those charged in the provinces.

Diesel fuel in the Yukon Territory is taxed at 16 cents per gallon and in the Northwest Territories 15 cents. Aviation fuel in the Yukon carries a two-cent tax and in the Northwest Territories 2½ cents.

There is a one-cent tax on heating fuel in the Yukon Territory and a three-cent tax in Northwest Territories.

There is no tax on tobacco in either Territory.

There are no personal or corporate income taxes levied by the Territorial governments themselves but the Federal Government levies them on behalf of the Territorial administrations.

Licence fees for most motor vehicles are considerably less than those charged in the provinces. For example, the following fees are charged under the Motor Vehicle Ordinance of the Yukon Territory:

a) Operators licences are for a one-year period and

may be obtained on production of a valid licence from any other province in Canada or any of the United States. First issues must pass a written and a driver's test. Fee \$2.00

b) Chauffeurs' licences are the same as operators licences, except that the written test has a few more questions. Fee \$5.00

c) Automobile licences are issued for a one-year period. The fee is based on the wheelbase of the vehicle:

Under 100" — \$15.00

101" - 120" — \$20.00

Over 120" — \$25.00

A reduction of 50% is made on October 1, and a reduction of 75% on January 1.

d) Truck licences are divided into four categories based on hauling capacity:

1 ton or less \$ 20.00

Over 1 ton to 3 tons \$ 35.00

Over 3 tons to 5 tons \$ 55.00

Over 5 tons \$105.00

A reduction of 50% is made on October 1 and a reduction of 75% on January 1.

e) PSV and RES licences are licences to haul goods in the Yukon Territory. The PSV licence is non-restricted authority. The RES is a restricted authority. As in the other provinces of Canada, there is a requirement for advertising, filing of objections and if required, a public hearing before the licence is issued. These licences are divided into categories:

Over 1 ton to 3 tons \$ 35.00

Over 3 tons to 5 tons \$130.00

Over 5 tons but with only two axles \$155.00

More than two axles \$255.00

f) Trailer licences are issued in two categories only:

1 ton or less \$ 3.00

Over 1 ton \$ 10.00

g) Through freighter licences are issued with the designation FT. These licences are issued for hauling goods through the Territory only and are issued in only two categories:

5 tons and under \$105.00

Over 5 tons \$205.00

h) Single trip permits may be obtained from the agent at Watson Lake in two categories: for hauling goods into and out of the Territory, one single trip \$100.00, and hauling goods through the Territory only, \$50.00

i) Compulsory insurance in an amount not less than \$50,000 all-inclusive must be proven before any vehicle licence is issued.

9B-1.1.2 Business Licences and Regulations

Other examples of licence and regulation requirements in the Yukon Territory:

a) Business licence ordinance. Any person or company wishing to do business in the Yukon outside the limits of the City of Dawson or the City of Whitehorse, must obtain a business licence. These licences are divided into a number of categories, the greater number of which are issued for a fee of \$25.00. One notable exception is the Contractor's Licence which is \$100.00 for non-resident and \$50.00 for a resident. Any company applying for a business

licence must produce proof of Workmen's Compensation insurance coverage for his employees, or take a statutory declaration to the effect that he does not have employees and that he will, if he becomes an employer, immediately take out Workmen's Compensation coverage.

At the present time, the publishing of newspaper and the business of searching for minerals, are exempted from the Business Licence Ordinance.

b) Lien legislation. The central office for the registration of liens is in the Department of the Territorial Secretary and Registrar General. Liens may be registered under the Bills of Sale Ordinance at a fee of \$1.00 per document; the Garage Keepers Lien Ordinance; the Conditional Sales Ordinance at \$1.00 per document, and also the Assignment of Book Debts Ordinance at a fee of 50¢ per document.

c) Companies Ordinance. Any company doing business in the Territories must either be incorporated under the Companies Ordinance or registered extra-Territorially under the Ordinance. Registration and incorporation fees are determined by the amount of capital to be invested in the Territory.

d) Corporation Securities Ordinance. This Ordinance applies to the registration of mortgages or charges of chattels, or assignment of book debts of a corporation. Registration of either mortgage charge or assignment should be effected by filing with the Registrar within 30 days of the execution of the instrument. Fees are \$1.00 per document.

e) Securities. Before any securities may be sold in the Yukon they must be registered under the Securities Ordinance. This may be accomplished by filing a copy of the Prospectus of the company, approved by the Securities Commission of B.C., Alberta, or Ontario, with the Registrar of Securities.

f) Workmen's Compensation. All employees in the Yukon Territory must be covered with Workmen's Compensation under the Yukon Work's Compensation Ordinance. This can be accomplished either by obtaining an exemption order of those employees covered by extended provincial coverage, or by purchasing a policy of Workmen's Compensation insurance to cover those employees hired in the Yukon Territory. The compensation coverage is as follows:

1. 75% of earnings based on a maximum of \$6,500.00 per year.
2. To a dependent widow, \$100.00 per month.
3. To a dependent child under the age of 18 years, \$45.00 per month.
4. To a dependent invalid child of any age, \$45.00 per month.

9B-2.1 Wages and Salaries

Labour costs North of 60 vary widely. Wage and salary levels on the Arctic Islands and the coastal regions may range up to 20% higher than the levels for similar jobs in the more accessible areas.

Following is a table of labour costs based on estimated wage and salary levels for a projected mining operation in an isolated region of the mainland. Of course, costs depend on the actual location and type of operation being planned.

In addition to these direct labour costs many northern mining companies provide free or low-cost housing, heat, power and water, and in some cases subsidized vacation travel expenses.

Job Classification Wage Classes	Grade	Wage/ Salary/ Rate (\$'s)
Tractor operator	1	3.20/hour
	2	3.05/hour
Shovel operator	1	3.80/hour
	2	3.20/hour
Truck driver	1	3.20/hour
	3	2.80/hour
Driller	1	3.25/hour
	4	2.80/hour
Labourer	—	2.55/hour
Crushing, grinding operator	1	3.05/hour
	3	2.80/hour
Flotation operator	1	3.25/hour
	2	3.02/hour
Heavy duty instrument mechanic	1	3.80/hour
	3	3.20/hour
Welder	1	3.55/hour
	3	3.15/hour
General maintenance	1	3.05/hour
	2	2.80/hour
Electrician	1	3.60/hour
	4	2.70/hour
Sampler	—	2.85/hour
Carpenter	1	3.50/hour
	4	2.70/hour
Janitor	—	2.55/hour
Salary Classes		
General Manager	—	2100/month
Resident Manager	—	1800/month
Personnel Officer	—	1000/month
Secretaries	1	600/month
	2	450/month
Clerk	1	600/month
	2	450/month
Accountant	1	800/month
Geologist	1	1500/month
	3	900/month
Mine mechanical mill Supt.	—	1500/month
Mine, etc. foreman	—	1150/month
Chief engineer	—	1350/month
Mine engineer	—	1000/month
Surveyor	—	800/month

Job Classification Wage Classes	Grade	Wage/ Salary/ Rate (\$'s)
Chief Metallurgist	—	1250/month
Assayer	1	800/month
	2	750/month
Purchasing agent	—	900/month
Warehouseman	1	700/month
	2	500/month
Medical agent	—	2100/month
Nurse	—	800/month
Recreation Director	—	1000/month

9B-2.1.1 Labour Legislation

The Yukon Labour Standards Ordinance sets out the following:

- Minimum wage \$1.75 per hour.
- Hours of work: 8 hours in the day, and 44 hours in the week, for work performed in a shop — that is, an establishment which dispenses goods or services to the public at retail — or 8 hours in the day, and 48 hours in the week, in all other establishments.
- Overtime. Overtime may be worked up to a maximum of 10 hours per day for which time and one-half must be paid. Any overtime requirement over a 10-hour day must have special permission from the Labour Standards Office.
- General holidays. The Ordinance lists 9 statutory holidays. Any employer requiring an employee to work on any one of these holidays must pay that employee two and one-half times the normal rate of pay. Employees that are not required to work and do not work on these holidays, must be paid straight time.
- Annual vacations. The Ordinance sets out an annual vacation for all employees to two weeks at the end of the first and each subsequent year. All employees must be paid 4% of gross pay, including overtime, in lieu of annual vacation, on termination.
- Advisory Board. The Ordinance provides for an Advisory Board which may advise the Commissioner on various matters pertaining to labour which have been referred to the Board.

9B-3.1 Utilities

9B-3.1.1 Power

The Northern Canada Power Commission is a Federal Crown corporation concerned with the planning, construction and management of public utilities, primarily electrical, on a commercial basis. It is empowered to survey utility requirements, construct utility plants and distribution systems and operate public utility plants in both Territories.

Under the Northern Canada Power Commission Act projects undertaken by the Commission shall be self-sustaining. Consequently rates charged for utilities supplied must provide sufficient revenue to cover interest on investment, repayment of principal over a period of years corresponding to the estimated economic life of the related projects,

operating, maintenance and administrative expenses, and a contingency reserve sufficient to meet unforeseen or emergency expenditures.

The head office of the Northern Canada Power Commission is in Edmonton.

Regional offices are located in Whitehorse and Yellowknife.

With the expansion of resource and economic development in the Yukon and the Northwest Territories expected to continue the energy needs of the Territories will continue to grow. The N.C.P.C. is conducting investigations into possible hydro power sites in both Territories.

A major development on the Aishihik River in the Yukon Territory would be tied into the existing Whitehorse-Faro transmission system, adding an additional 30 megawatts to the system.

Generally speaking, there is little excess capacity in present Territorial hydro-electric plants. However, the Northern Canada Power Commission, a Crown corporation which plans (and in some cases operates) power generation facilities in Northern Canada has a very flexible policy towards power generation facilities. This was demonstrated in the Taltson River hydro-electric scheme, primarily built to meet the power requirements at Pine Point Mines Ltd., on the south shore of Great Slave Lake. The scheme, with a generating capacity of 18,000 kilowatts, is located on the Taltson River some 35 miles northeast of Fort Smith, NWT. Power is being supplied to Pine Point by means of a 170 mile transmission line (115 kv.). At present, Pine Point Mines Ltd. requires 11,000 kilowatts of power, but expansion of the mine/mill operations will require an additional 2,000 kilowatts. At present, then, excess capacity available for new purposes is around 5,000 kilowatts. Recently, the Northern Canada Power Commission stated that preliminary investigations indicated that around 50,000 kilowatts could be generated in the area by extending the present scheme.

Voltage of Territorial power lines varies from 34 kv to 138 kv, the actual voltage depending on transmission load and distance.

Rates for electric power supplied to relatively large industrial users in the Territories range from about 0.6-2.0 cents per kilowatt hour. The actual rate charged depends on location, quantity of power required, transmission distance, and pattern usage.

The following are examples of industrial power costs at various points North of 60.

Location	Rate (¢ per kwh)
Yellowknife, N.W.T.	
(1960 — 4 megawatt capacity)	1.50
(1968 — 20 megawatt capacity)	0.85
Pine Point, N.W.T.	
(1968 — 25 megawatt capacity)	1.10
(1968 — 35 megawatt capacity)	0.90
(1968 — 50 megawatt capacity)	0.60

Location	Rate (¢ per kwh)
Coppermine, N.W.T. (Preliminary investigation)	1.50
Frobisher Bay, N.W.T. (Preliminary investigation)	2.75
Anvil, Y.T. (1969 — expected rate)	1.00
Clinton Creek, Y.T. (Preliminary investigation)	1.75

For further information write:
 Northern Canada Power Commission
 P.O. Box 7500 Station L,
 Edmonton, Alberta T6C 4J8 (403) 465-3377

9B-3.1.2 Fuel Oil

The prime source of electricity and heat North of 60 is fuel oil. When used in small quantities, for heating or diesel electric generating systems, it is normally handled in 45 gallon drums. Transportation of drums in the Territories is expensive, and wherever possible, bulk storage tanks have been constructed where a reasonable quantity of fuel oil is being used.

Under a Regional Price Agreement, the Hudson's Bay Company acts as the retailing distributor, an arrangement which has resulted in cheaper oil in the isolated areas. In addition, individual arrangements have been made with oil companies at other locations to act as agents.

Departmental tanks are located, by region:

Region A	Coppermine Spence Bay
Region B	Eskimo Point Rankin Inlet Whale Cove Baker Lake Chesterfield Inlet Igloolik Coral Harbour
Region C	Sugluk Cape Dorset
Region D	Pond Inlet Pangnirtung

Fuel oil in the Yukon is supplied to Whitehorse from Pacific tidewater at Skagway through a four-inch pipeline, and from Whitehorse to other Yukon points by tank truck. The pipeline and trucking operations are controlled by the White Pass and Yukon Railway.

Table 9B-1

Commercial Energy Producing Installations In the Yukon and Northwest Territories

Location	Agency	Type	Installed Capacity
<i>Yukon</i>			
Whitehorse	Y.E.C.L. ^{1.}	Hydro	1,650 Kw
Whitehorse	N.C.P.C. ^{2.}	Hydro	19,000 Kw
Whitehorse	N.C.P.C. ^{2.}	Thermal	9,000 Kw
Mayo	N.C.P.C. ^{2.}	Hydro	4,500 Kw
Dawson	N.C.P.C. ^{2.}	Thermal	750 Kw
Watson Lake	Y.E.C.L.	Thermal	1,480 Kw ³
Carmacks	Y.E.C.L.	Thermal	450 Kw
Destruction Bay	Y.E.C.L.	Thermal	500 Kw
Haines Junction	Y.E.C.L.	Thermal	400 Kw
Teslin	Y.E.C.L.	Thermal	500 Kw
Beaver Creek	Y.E.C.L.	Thermal	310 Kw
Swift River	Y.E.C.L.	Thermal	200 Kw
Ross River	Y.E.C.L.	Thermal	260 Kw
Old Crow	Y.E.C.L.	Thermal	150 Kw
Stewart Crossing	Y.E.C.L.	Thermal	100 Kw
Pelly River	Y.E.C.L.	Thermal	100 Kw
<i>NWT</i>			
Hay River	N.U. ⁴	Thermal	2,475 Kw
Enterprise	N.U.	Thermal	150 Kw
Fort Providence	N.U.	Thermal	150 Kw
Yellowknife	N.C.P.C.	Hydro	13,000 Kw
Fort Smith	N.C.P.C.	Thermal	2,250 Kw ^{5.}
Fort Simpson	N.C.P.C.	Thermal	1,100 Kw
Inuvik	N.C.P.C.	Thermal	4,500 Kw
Fort McPherson	N.C.P.C.	Thermal	750 Kw
Fort Resolution	N.C.P.C.	Thermal	325 Kw
Frobisher Bay	N.C.P.C.	Thermal	4,000 Kw
Aklavik	N.C.P.C.	Thermal	470 Kw
Taltson	N.C.P.C.	Hydro	18,000 Kw ^{6.}
Coppermine	N.C.P.C.	Thermal	600 Kw

1. Yukon Electrical Co. Ltd.

2. Northern Canada Power Commission

3. Will probably be connected to the 138 Kw. Anvil line in the near future.

4. Northland Utilities Ltd.

5. Standby plant only. Fort Smith receives power from the Taltson River hydro plant.

6. The Taltson hydro plant supplies power to Fort Smith, Pine Point Mines Ltd., and the town of Pine Point.

In the Mackenzie District of the Northwest Territories, the main supply is from the Imperial Oil refinery at Norman Wells. Oil from Norman Wells is transported almost entirely by barge along the Mackenzie River system, and by freighters along the Arctic Coast during the summer season. The Great Slave Lake region is supplied mainly by truck and rail service from Edmonton. Fuel oil and other petroleum for the Keewatin District and the eastern and northern Arctic Islands come from Venezuela.

Examples of fuel oil prices at various points, for industrial users (¢ per Imperial gallon):

Frobisher Bay, NWT	25¢
Yellowknife, NWT	30¢
Whitehorse, YT	25¢
Dawson, YT	35¢

Heavy fuel oil is available from Norman Wells. It has been estimated that this grade of oil could be supplied to points on Great Slave Lake at about 16¢ per gallon.

9B-3.1.3 Gasolines and Gas

Distribution of gasoline and gas (natural or liquefied petroleum) follows a similar pattern to fuel oil.

In the Yukon, the products are carried to Whitehorse by the White Pass and Yukon Railway, and by truck from Whitehorse.

In the Northwest Territories, the Mackenzie District is supplied by Norman Wells. Eastern seaboard refineries supply the Keewatin District and the Arctic Islands.

Examples of gasoline prices for industrial consumers (¢ per Imperial gallon):

Frobisher Bay, NWT	47¢
Yellowknife, NWT	50¢
Whitehorse, YT	50¢
Dawson, YT	60¢

While natural gas has been discovered North of 60, as yet there are no natural gas pipelines supplying Territorial points. However, recent studies have indicated the wellhead price for natural gas at southern Territorial wells would average 12-16¢ per 1,000 cubic feet. If this gas were transported by pipeline 200 miles, the cost would average 10¢ per 1,000 cubic feet (20,000,000 cubic feet per day) to 25¢ per 1,000 cubic feet (5,000,000 cubic feet per day).

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Territorial Government "C"

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Revised January, 1974

Territorial Government

9C-1.1 General

The evolution of government in the Yukon and the Northwest Territories continues to keep pace with the economic development of the two regions. As the population grows, as the indigenous peoples assume greater responsibilities in their communities, and as economic development brings greater prosperity and opportunities, the degree of local participation increases. The Federal Government has overriding jurisdiction North of 60 and is sponsoring a gradual transition from Federal to Territorial government responsibility and administration.

The Territorial Governments are unique in many ways. In both Territories, the Commissioner is appointed by the Federal Government, the control of certain government fields is retained by the Federal Government, and the Federal Government still holds considerable control over Territorial legislation and meets the bulk of the cost of these northern governments.

A main area in which direct control has been retained by the Federal Government is the field of natural resources. Exceptions in the case of natural resources are found in game and land surrounding communities and settlements which are under the jurisdiction of the Territorial Governments.

Under the division of responsibilities between the Federal and Territorial Governments, most of the Territorial ordinances are administered by the Territorial public services of the Yukon and increasingly so in the Northwest Territories. Some are administered by agencies of the Federal Government.

Federal administration covers such fields as Public Health Ordinances and Regulations, the Mining Safety Ordinance and the Blasting Ordinance, and the Minister of Justice for Canada is the Attorney General of the two Territories. The Federal Government also administers its own legislation with respect to the resource field.

9C-1.1.1 Territorial Representation

Both the Yukon and Northwest Territories send one elected representative to the Federal Parliament in Ottawa.

9C-1.1.2 Local Government

The development of local governments is actively encouraged in both Territories and, in both Territories, specific departments have been established to foster, encourage, and assist in this matter. Some communities already have a well-established local government responsible for the normal operation and systematic development of their areas.

9C-2.1 The Yukon Territory

The basic legislation providing for the Government of the Yukon Territory is the Yukon Act. It provides for a Commissioner to administer the government of the Territory under instructions issued from time to time by the Governor in Council or the Minister of Indian Affairs and Northern Development. In 1970

an Executive Committee was established consisting of the Commissioner, the two Assistant Commissioners and two members of the Territorial Council chosen by the Council. In addition to their responsibilities as members of the Executive Committee the two elected representatives administer certain Departments of the Territorial Government.

The Legislative Council of the Yukon consists of seven members elected from constituencies throughout the Territory. The Members are elected for a four-year term of office unless the Council is previously dissolved by the Governor in Council (Federal Cabinet). The Council is presided over by one of its own members who is chosen as Speaker at the beginning of each four-year term.

The legislative powers of the Commissioner in Council are roughly analogous to those of a provincial Legislative Assembly. Under the terms of the Yukon Act, these powers include legislation in the following fields of jurisdiction.

Direct taxation
Territorial offices and municipal institutions
Election of the members of the Council
Occupation or Business licences
Company incorporation
Marriage laws
Property and civil rights
Administration of justice
Game laws
Education
Control of intoxicants
Hospitals
Welfare
Agriculture
Expenditures from the Yukon Consolidated Revenue Fund
Fines, penalties, imprisonment
Other local and/or private matters within the terms of the Act

Legislation passed by the Council may be disallowed by the Governor in Council within one year of its passage. Unlike the situation in the provinces the legislative powers of the Council are derived from the Parliament of Canada and may be changed from time to time.

9C-2.1.1 Public Service

The Public Service of the Yukon is separate and distinct from the Federal Public Service. It is divided into major departments with the following general areas of responsibility:

Administrative Services:

Personnel
Central Purchasing and Inventory Control
Central Registry
Legal
Housing and Accommodations
General Printing and Stationery

Financial and Accounting Services:

Accounting
 Estimates
 Payroll
 Revenue
 Expenditures
 Internal Audit
 Budget Control
 Hospital Insurance

Territorial Secretary:

Enforcement of ordinances
 Public Administrator
 Liquor
 Labour
 Registrar of Companies
 Inspection

Engineering and Municipal Services:

Administration
 Mechanical
 Vehicle and Equipment Pool
 Road Maintenance
 Buildings
 Projects
 Municipal Affairs
 Assessments

Education and Vocational Training:

Primary Schools
 Secondary Schools
 Vocational and Technical Schools
 Administration

Welfare and Rehabilitation:

Welfare
 Correction
 Probation

Health Services:

Public Health Services
 Northern Health Services

Conservation and Recreation:

Game Ordinances
 Library Services
 Travel and Publicity
 Fitness and Amateur Sport

The Territorial department heads are individually responsible for the administration of their department to the Executive.

9C-3.1 Northwest Territories

The Northwest Territories Act establishes and outlines the scope and powers of the Commissioner and the Council. In 1966 the Report of the Advisory Commission on the Development of Government in the Northwest Territories made recommendations for the development of government for the next ten years. Subsequently, the Federal Government implemented a number of the recommendations and established a series of Task Forces to study ways of implementing other recommendations.

Yellowknife was named the seat of government

of the Northwest Territories in 1967 and Territorial Government employees began arriving in the town before the end of the year to commence taking over their duties.

A Public Service for the Northwest Territories was established and various programs, including education and welfare were transferred to the Territorial Government on April 1, 1969 for the Mackenzie District and April 1, 1970 for the Eastern Arctic.

The Northwest Territories Act provides for partial representative government but not responsible government for the Territories. Executive authority is placed in the Commissioner who is appointed by, and who is responsible to, the Federal Government. The Council is composed of ten elected and four appointed members. The elected members represent constituencies throughout the whole of the Territories and the Commissioner presides over the Council in session. All Council Members serve for a term of four years. Like the Yukon Act, the Northwest Territories Act provides a wide range of legislative power to the Commissioner in Council and authorizes a Northwest Territories Consolidated Revenue Fund.

9C-3.1.1 The Public Service:

The Government of the Northwest Territories is composed of 8 departments and an Executive Secretariat. The main responsibilities are:

Executive Secretariat:

Management Audit
 Personnel Policy
 Financial Co-ordination and Program Analysis
 Special Projects

Local Government:

Municipal Ordinance
 Fostering, encouraging and assisting in the development of local government
 Housing Programs
 Employment of Native People

Industry and Development:

Promoting and assisting industrial development, tourism, game.

Department of Social Development:

Corrections Service
 Family Services and Child Welfare
 Rehabilitation and Medical Services
 Alcohol Education

Department of Public Services:

Legal Counsel
 Ordinance Administration
 Licences
 Permits
 Registrations
 Legislative Counsel
 Magistrate's and Territorial Courts
 Labour
 Administration and Enforcement of Safety Regulations
 Liquor Control System

Department of Administration:

Financial Operations
 Material Management
 Data Processing
 Administrative Services
 Personnel Administration

Department of Information:

The Department of Information is a service department, reporting directly to the Commissioner, with responsibility for informing the public of the Territorial Government's programs and activities.

Department of Education:

School Services
 Adult Education
 Curriculum Development

Department of Public Works:

All aspects of public works operations including design, construction and maintenance of roads, buildings and municipal-type services.

9C-4.1 Government Services**9C-4.1.1 Housing**

The type, size and number of houses provided in a community often has a far-reaching effect on the social and economic development of that community. For this reason all levels of government concern themselves with housing North of 60. In particular, the Territorial Governments are taking an increasingly active part in the development of housing in their regions.

The Central Mortgage and Housing Corporation (CMHC) is a Crown agency and, as such, is responsible for the administration of the National Housing Act and co-ordination of the activities of the Federal Government in the housing for all of Canada. The present National Housing Act is defined as an act "to promote the construction of new houses, the repair and modernization of existing houses and the improvement of housing and living conditions". The Corporation has the authority and responsibility for a variety of functions affecting housing in both the long term and the immediate future. It is empowered to act as an insurer of mortgage loans, as a lender or investor of public funds, as a guarantor and as an owner of property and other assets. It also acts as a research agency in fields associated with housing and assists provinces, the Yukon and Northwest Territories and municipalities in many aspects of urban growth.

In general, the Federal Government, through the successive housing acts, has attempted to stimulate and supplement the market for housing rather than assume direct responsibilities that rightfully belong to other levels of government or that could be borne more effectively by private enterprise. In each case the aim has been to increase the flow of mortgage money and to encourage lenders to make loans on more favourable terms to home owners.

A second mortgage plan has been introduced by the governments of the Yukon and Northwest

Territories as a supplement to amounts available under the National Housing Act. This plan is designed to assist those who qualify for a first mortgage under the Act but because of the higher costs of construction in the North, need additional assistance. This program is administered by CMHC on behalf of the Territorial Governments.

CMHC has established offices in Whitehorse and Yellowknife to improve its lending facilities and provide a more direct advisory service to the Territorial Governments. Regular consideration of housing problems and needs in the Territories is given by joint meetings of the Territorial Governments with representatives of the Department of Indian Affairs and Northern Development and officials of CMHC.

Recent legislation in the Northwest Territories has been enacted by the Territorial Government in the form of the Housing Development Ordinance which complements the National Housing Act and which is intended "to promote the improvement of housing and living conditions in the Northwest Territories". The Ordinance provides for the Commissioner or a municipality with the approval of the Commissioner to enter into agreements with CMHC to undertake and operate public housing projects, to acquire and develop land for housing purposes, to prepare and implement urban renewal schemes, to undertake student housing projects and to construct sewage treatment projects. As a result of the legislation the Territorial Government has requested CMHC to participate in public housing, land assembly, urban renewal projects as well as construction of rental housing in Yellowknife, Hay River, Inuvik and Fort Smith.

In 1966 the Department of Indian Affairs and Northern Development implemented a rent to income housing program for Eskimos and Indians in the Northwest Territories. This was followed by a Government of the N.W.T. program of a similar nature for the Metis. New three bedroom houses have been constructed in many communities and as well some existing houses have been brought into the program.

In 1972 the Government of the Yukon Territory created a low income rental-purchase housing program which is financed on a shared basis between C.M.H.C., the Territory and the Department of Indian Affairs and Northern Development.

Both the N.W.T. and Yukon Governments have approved territorial housing corporations.

Special assistance programs in the form of low-rental housing have been introduced by the Federal Government and by the Governments of both Territories to deal with the housing needs of the low income indigenous families.

The Territorial Governments are actively interested in the growth of the North and recognize that an economy cannot develop properly unless it is accompanied by reasonably permanent settlements. This goal can never be obtained without adequate housing. The housing programs in effect at present have been introduced in the belief that they will assist economic growth both by providing a fund to finance home ownership and by supplying low-rental accommodation to those people not able to

purchase housing and by encouraging the use of local resources wherever feasible.

9C-4.1.2 Health

Because of the special problems in developing health services North of 60, the Department of National Health and Welfare has been given the responsibility of co-ordinating federal and territorial health care for all residents. In this role the Department assists the Territorial Governments in providing public health services. Health facilities range from modern hospitals to lay dispensaries operated by a trader, policeman or missionary at some very remote settlements. Although there are several doctors in private practice, along with Territorial, community and church operated hospitals in some settlements, most facilities and staff elsewhere in the Yukon and Northwest Territories are supplied by the Northern Health Service of the Department. The object of both the Federal and Territorial Governments is to ensure that medical and other health services, comparable to those in other parts of Canada, are available to residents North of 60.

The overall problem of health service in the North is to provide health care with a limited number of staff to comparatively small groups of people scattered over more than 1,000,000 square miles.

9C-4.1.3 Welfare

The programs of social welfare in effect North of 60 are aimed at making available social welfare benefits which not only reflect the special needs of the northern people but at the same time are comparable in scope and quality to those available in southern Canada. Northern Canadians receive aid in the same manner and same amounts as other residents of Canada under federal programs such as family allowances, old age security, old age assistance and blind and disabled persons' allowances. In addition, there are programs for neglected children, homes for the aged, medical social services especially for problems relating to the hospitalization of Indians and Eskimos and a social assistance program providing food, clothing and shelter to those who are in temporary financial distress. Both the Yukon and the Northwest Territories have joined the Canada Assistance Plan.

9C-4.1.4 Education

The school systems in the Yukon and Northwest Territories are operated by the Territorial Governments through directors and staff responsible to the Commissioners. With the exception of two school districts in the Northwest Territories, all schools are government operated. Wherever possible, classrooms and teachers are provided locally to meet community education needs but because of distance and small populations this arrangement is not always feasible. Pupil residence facilities have been established at larger centers (mainly in the Northwest Territories for secondary or vocational pupils) to accommodate students from distant points.

An extensive system of special education programs has been set up to meet the needs of the

local people. They include vocational and apprenticeship training programs in addition to normal elementary and secondary courses. Also, adult education is available to provide the educational training and guidance which adults require to face the complex social, economic and cultural problems they encounter in their rapidly changing environment. Where necessary, North of 60 residents may be sent to educational institutions in the provinces, if appropriate training courses are not available in the North.

University level education facilities are not available in the Territories. However, grants to cover costs of tuition, transportation and living expenses are available to students who wish to attend outside universities.

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9D-1 Centres of Population of 200 and Over

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9D-1 Population Settlements in Yukon Territory

9D-2 Population Settlements in Northwest Territories

Revised January, 1974

Municipalities

9D-1.1 Yukon

The main communities of the Yukon Territory:

9D-1.1.1 Whitehorse (City of)

Population:

11,217 (1971 Census)

Location:

On Yukon River, 900 miles northwest of Vancouver, B.C., 390 miles south of Arctic Circle.

Municipal Status:

An incorporated municipality governed by an elected council composed of a mayor and six aldermen.

Federal Agencies:

Indian Affairs and Northern Development
Public Works
Customs and Excise
Manpower and Immigration
Royal Canadian Mounted Police
Central Mortgage and Housing Corporation
National Health and Welfare
Canadian Broadcasting Corporation
National Defence
Canadian National Telecommunications
Unemployment Insurance Commission
Energy Mines and Resources
Justice
Environment
Post Office
Northern Canada Power Commission
Ministry of Transport

Services:

Fire Department
Police (RCMP)
Hospital (112 beds)

Utilities:

Power — Yukon Electrical Company
(Local Distribution)
Northern Canada Power Commission
(Production Transmission)
Water — City of Whitehorse
Sewerage — City of Whitehorse

Schools:

Five Elementary Schools, Two Secondary (high) schools and a Vocational and Technical Training Centre.

Churches:

Presbyterian, Baptist, Seventhday Adventist, Nazarene, Lutheran, United, Roman Catholic, Jehovah's Witnesses, Latter Day Saints, Bethany Tabernacle, Anglican, Northern Canada Evangelical Mission.

Transportation:

Rail — White Pass and Yukon Route to Skagway, Alaska.

Air — Modern airport capable of handling jet transports, Radio range, meteorological stations. Scheduled airlines to Seattle, Vancouver, Edmonton, Fairbanks and Inuvik.

Road — Alaska Highway to southern Canada and Alaska.

Water — Local water transport on Yukon River.

Communications:

Mail, telephone, telegraph, radio and television facilities. Newspaper, the "Whitehorse Star" published twice a week and the weekly "Yukon News".

Public Facilities:

Community centre, hotels, motels, banks (4), theatres (5), stores and other community facilities.

9D-1.1.2 Dawson (City of)

Population:

762 (1971 Census)

Location:

On the Yukon and Klondike Rivers, 388 road miles northwest of Whitehorse.

Municipal Status:

An incorporated municipality governed by an elected council composed of a mayor and four aldermen.

Federal Agencies:

Indian Affairs and Northern Development
Customs and Excise
National Health and Welfare
Ministry of Transport
Royal Canadian Mounted Police
Post Office
Northern Canada Power Commission
Canadian National Telecommunications
Canadian Broadcasting Corporation

Services:

Hospital (5 beds), Fire Department, Police (RCMP)

Utilities:

Power — Northern Canada Power Commission
Water — Northern Canada Power Commission
Sewerage — Northern Canada Power Commission

Schools:

Elementary and high schools.

Churches:

Anglican, Roman Catholic, Pentecostal Tabernacle, Jehovah's Witnesses.

Transportation:

Scheduled flights to and from Whitehorse/Inuvik.
Regular bus service to and from Whitehorse.
Sixty Mile Road open during summer months only
between Dawson and Alaska. Local water transport.

Communications:

Regular mail, telephone, telegraph, radio,
television, weekly newspaper.

Public Facilities:

Hotels, motels, stores, banks, restaurants, historic
Palace Grand Theatre restored as National
Historic Site.

*9D-1.1.3 Faro (Town of)***Population:**

863 (1971 Census)

Location:

130 miles northwest of Whitehorse.

Municipal Status:

An incorporated municipality governed by an elected
council composed of a mayor and four aldermen.

Federal Agencies:

Indian Affairs and Northern Development
National Health and Welfare
Royal Canadian Mounted Police
Canadian National Telecommunications
Northern Canada Power Commission
Canadian Broadcasting Corporation

Services:

Nursing Station (5 beds)
Police

Utilities:

Power — Northern Canada Power Commission
Water — Town of Faro
Sewerage — Town of Faro

Schools:

Elementary and Secondary Public Schools.

Churches:

Church of the Apostles (one church serving Roman
Catholic, Anglican, Presbyterian, United, Lutheran
and Baptist).

Transportation:

Airport operated by Anvil Mines; uncontrolled —
no radio installation or control tower. No scheduled
flights. An all-weather road to Carmacks/Whitehorse
and Ross River/Watson Lake.

Communications:

Mail, telephone, telegraph, radio and television
facilities.

Public Facilities:

Hotel, store, bank, community hall.

*9D-1.1.4 Watson Lake***Population:**

642 (1971 Census)

Location:

220 miles southeast of Whitehorse.

Municipal Status:

Local Improvement District. Governed by three
elected trustees

Federal Agencies:

Indian Affairs and Northern Development
National Health and Welfare
Public Works
Post Office
Transport
Canadian National Telecommunications
Canadian Broadcasting Corporation
Royal Canadian Mounted Police

Services:

Hospital (10 beds)
Fire department
Police

Utilities:

Power — Yukon Electrical Company Sewer system.

Schools:

Elementary and Secondary Public Schools.

Churches:

Anglican, Roman Catholic, Pentecostal, Baptist.

Transportation:

Air — Scheduled airline services to Whitehorse,
Edmonton, Vancouver.
Road — Alaska Highway to Edmonton, Whitehorse;
connections to B.C. interior.

Communications:

Telegraph, telephone, radio and television.

Public Facilities:

Hotels, motels, restaurants, theatre and other
community services.

9D-2.1 Northwest Territories*9D-2.1.1 Yellowknife***Population:**

6,122 (1971)

Location:

On west shore of Yellowknife Bay, Great Slave Lake.

Municipal Status:

City. Capital of the Northwest Territories. Govern-
ment by council composed of mayor and eight
councillors.

Federal Agencies:

Department of Indian Affairs and Northern Development.
 Department of Energy, Mines and Resources.
 Department of Justice.
 Department of Manpower and Immigration — Canada Manpower Centre.
 Department of National Health and Welfare.
 Department of Public Works.
 Department of Transport.
 R.C.M.P.
 Department of National Defence.

Services:

Fire department.
 Police. (R.C.M.P.)
 Hospital (50 beds) 7 medical practitioners, 3 dentists, ophthalmologist, optometrist, chiropractor.

Utilities:

Power — Northern Canada Power Commission.
 Water — Town of Yellowknife.
 Sewerage — Town of Yellowknife.

Schools:

Two primary Schools Kindergarten to Grade 9, inclusive to Secondary Schools Grades 10 to 12, including vocational training. Hostel — Akaitcho Hall. Capacity — 200.

Churches:

Anglican, Roman Catholic, Baptist, Church of the Nazarene, Pentecostal Tabernacle, Lutheran, United Church, Seventh Day Adventist, Baha'i World Faith.

Communications:

Telephone and telex — Landline and Microwave Canadian National Telecommunications, Radio — R.C.M.P., M.O.T., Mackenzie Forest Service, D.N.D. Daily mail service. Postal Code: X0E 1H0. Newspapers: News of the North, Yellowknifer. Communication Media: Canadian Broadcasting Corporation.

Public Facilities:

Hotels, banks, stores, theatres, golf course, and other community facilities.

9D-2.1.2 Inuvik**Population:**

2,669 (1971)

Location:

East channel of the Mackenzie River Delta, 60 miles south of Beaufort Sea and 125 miles north of Arctic Circle.

Municipal Status:

Town

Federal Agencies:

Department of Indian Affairs and Northern Development. (Northern Administration Branch, Indian Affairs Branch, Canadian Wildlife Service, Northern Coordination and Research Centre).
 Department of National Defence.
 Department of National Health and Welfare.
 Department of Public Works.
 Department of Transport.
 R.C.M.P.

Services:

Volunteer Fire Department. 18 men. R.C.M.P.
 100 bed hospital, 5 Doctors, 2 Dentists.
 Public Health Clinic.

Utilities:

Power, water, heat provided by Northern Canada Power Commission.

Schools:

Primary School Grades Kindergarten to 6 inclusive.
 Secondary School Grades 7 to 12, inclusive.

Churches:

Roman Catholic, Anglican, Pentecostal, Baha'i World Faith, Church of Latter Day Saints.

Transportation:

Air — modern airport. Scheduled flights to Edmonton and intermediate stops. Non-scheduled flights to Yukon and Arctic Points.
 Water — Barge service along Mackenzie River waterway.
 Road — 25 miles of local roads.

Communications:

Mail, telephone, telegraph, radio facilities. Weekly newspaper, "The Drum", printed in English, Eskimo and Indian.

Public Facilities:

Hotels, stores, banks, restaurants, laundry, theatre and dry-cleaning establishment operated by Department of Indian Affairs and Northern Development, and other community services.

9D-2.1.3 Fort Smith**Population:**

2,364 (1971)

Location:

On west bank of Slave River, one mile north Alberta — N.W.T. border, 450 miles north of Edmonton.

Municipal Status:

Town.

Federal Agencies:

Department of Indian Affairs and Northern Development.
Ministry of Transport.
District Treasury Office, Department of Finance.
Department of National Health and Welfare.
Department of Public Works.
R.C.M.P.

Services:

Fire Department
Hospital (50 beds) Doctors, dentist, ophthalmologist.
Public Health Center, two nurses.
Police.

Utilities:

Power — Northern Canada Power Commission.
Water — Town of Fort Smith.
Sewerage — Town of Fort Smith.

Schools:

Primary School Grades 1 to 6 inclusive, Secondary School Grade 7 to 12 inclusive. Grandin College.
Adult Vocational Training Center.

Churches:

Roman Catholic, Anglican, Church of the Nazarene
Baha'i.

Transportation:

Air — regular scheduled flights to Yellowknife, Edmonton, Uranium City, Prince Albert, Sask.
Road — Highway connections to Pine Point, Hay River and Mackenzie Highway system.
Water — Trans-shipment center on Mackenzie River system.

Communications:

Mail, telephone, telegraph, radio, television.

Public Facilities:

Hotels, banks, stores, community centre, library, golf course, skiing.

*9D-2.1.4 Hay River***Population:**

2,406 (1971)

Location:

At mouth of Hay River on south shore of Great Slave Lake.

Municipal Status:

Town.

Federal Agencies:

Department of Indian Affairs and Northern Development.
Department of Public Works.
Department of Fisheries.
Ministry of Transport
R.C.M.P.

Services:

Fire department. Volunteer, 21 men.
Hospital — 30 bed capacity. Medical Clinic — 3 Doctors, dentist, Public Health Centre — 3 nurses.
Police.

Utilities:

Power — Northland Utilities Limited.
Water — sewerage, garbage collection.

Schools:

Primary School Grades Kindergarten to 6, inclusive.
Secondary School Grades 7 to 12, inclusive.

Churches:

Roman Catholic Mission, Anglican, Pentecostal, Baha'i.

Transportation:

Air — regular service to Edmonton, Yellowknife, Peace River, Fort Smith.
Road — Mackenzie Highway to southern Canada and Yellowknife. Regular bus service.
Rail — Northern terminus of Great Slave Lake Railway.
Water — Great Slave Lake and Mackenzie River transport service.

Communications:

Mail, telephone, telegraph, radio, television,
Weekly newspapers, "Tapwe", "Hay River News".

Public Facilities:

Hotels, restaurants, banks, and other community facilities, arena, tourist camps.

*9D-2.1.5 Frobisher Bay***Population:**

2,014 (1972)

Location:

At head of Frobisher Bay on southeast corner of Baffin Island.

Municipal Status:

Hamlet.

Federal Agencies:

Regional headquarters, Department of Indian Affairs and Northern Development.
Eastern Arctic sub-division headquarters, R.C.M.P.
Ministry of Transport.

Services:

Fire Department, Volunteer, 25 men. Police.
Hospital, (Clinic. Doctors and Nurses)

Utilities:

Power — Northern Canada Power Commission diesel electric plant.
Water delivery, sewerage, garbage services under contract by Department of Indian Affairs and Northern Development.

Schools:

Primary School Grades Kindergarten to 6, inclusive.
Secondary School Grades 7 to 12, inclusive.

Churches:

Anglican mission, Roman Catholic mission.

Transportation:

Air — modern airport. Scheduled service to Montreal and Arctic points.
Water — major Arctic resupply base.

Communications:

Mail, telephone, telegraph, radio, television.

Public Facilities:

Store, bank, local transportation facilities, theatre.

*9D-2.1.6 Baker Lake***Population:**

756 (1972)

Location:

200 miles inland from west coast of Hudson Bay,
Latitude 64° N, Longitude 96° W.

Municipal Status:

Unincorporated.

Federal Agencies:

Department of Indian Affairs and Northern Development.
Ministry of Transport.
R.C.M.P. Keewatin sub-division.
Department of National Health and Welfare.
National Research Council.

Services:

Fire Department 12 men, volunteers.
Police — R.C.M.P.
Nursing Station, 2 nurses. Nearest hospital Churchill, 392 miles by air.

Utilities:

Local services provided.

Schools:

Primary School Grades 1 to 8 inclusive.

Churches:

Anglican, Roman Catholic, Eskimo Christian Fellowship, Baha'i.

Transportation:

Air — scheduled service to Churchill and points north.
Water — summer lake freight service.

Communications:

Mail, telephone, radio, radio-telephone service.

Public Facilities:

Hudson's Bay Company northern store.

*9D-2.1.7 Cambridge Bay***Population:**

716 (1972)

Location:

On southeast tip of Victoria Island, 1150 miles northeast of Edmonton.

Municipal Status:

Unincorporated.

Federal Agencies:

Department of Indian Affairs and Northern Development.
Ministry of Transport.
R.C.M.P.

Services:

Fire Department, Volunteer, 14 men.
Nursing Station, one doctor and 3 nurses. Nearest hospital in Yellowknife, 529 air miles.

Utilities:

Water, sewage and garbage disposal provided under contract.

Schools:

Federal school and hostel.

Churches:

Anglican, Roman Catholic, Pentecostal

Transportation:

Air — Scheduled airline service from Yellowknife, Edmonton.
Water — Summer sea lift service.

Communications:

Telephone, radio.

Public Facilities:

Hotel, supermarket, theatre, library, curling rink, social club.

*9D-2.1.8 Fort Simpson***Population:**

747 (1971)

Location:

On an island at the confluence of the Mackenzie and Liard Rivers.

Municipal Status:

Hamlet governed by a local council.

Federal Agencies:

Ministry of Transport.
RCMP.
Post Office.

Services:

Mission hospital.

Utilities:

Water, sewage, garbage disposal.
Power — Northern Canada Power Commission.

Schools:

Primary and secondary schools, two hostels.

Churches:

Anglican, Pentecostal, Roman Catholic.

Transportation:

Air — Pacific Western Airlines twice weekly from Edmonton.
Water — Northern Transportation Co. Ltd. from Hay River.
Road — Truck transport from Edmonton.

Communications:

Telephone — Canadian National
Telecommunications.
Radio — RCMP, Forestry, Game Management.
Mail — twice weekly.

Public Facilities:

Volunteer fire department, RCMP, library, community hall, curling rink, skating rink, theatre, track, tennis court, ball diamond, one hotel, two motels, beer and liquor store.

*9D-2.1.9 Pine Point***Population:**

1,225 (1971)

Location:

On the south side of Great Slave Lake.

Municipal Status:

Village governed by council.

Federal Agencies:

Ministry of Transport.
RCMP.

Services:

Mine clinic.

Utilities:

Water, sewage, garbage collection twice weekly.
Power — Northern Canada Power Commission.

Schools:

Primary, secondary schools.

Churches:

Roman Catholic, Church of the Nazarene.

Transportation:

Bus from Hay River.

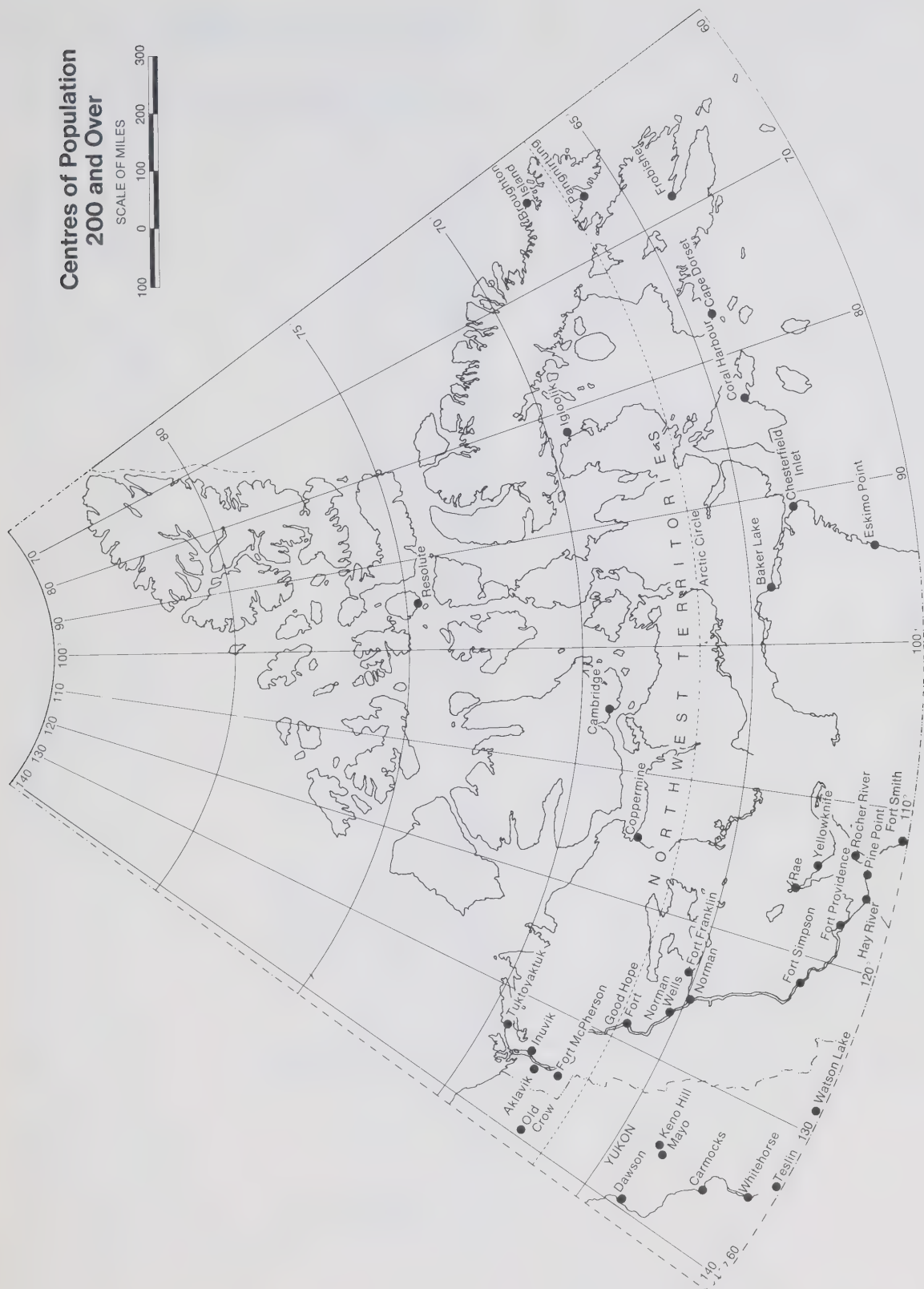
Communications:

Telephone — Canadian National
Telecommunications.

Public Facilities:

Library, bank, curling, skating rink, community hall, hotel, beer and liquor store, dining lounge, taxi service.

SCALE OF MILES



Map 9D-1

Table 9D-1

Population — Settlements in Yukon Territory

PRELIMINARY COUNTS OF THE 1971 Census with
corresponding 1966 population figures

	1966	1971
Whitehorse	4,771	11,084*
Faro	—	850
Dawson	742	745
Watson Lake	554	553
Mayo	479	462
Clinton Creek	—	381
Carmacks	311	348
Teslin	324	340
Ross River	173	317
Elsa	529	298
Upper Liard	148	219
Old Crow	218	206
Carcross	199	188
Haines Junction	195	179
Pelly Crossing	137	141
Beaver Creek	114	120
Watson Lake Airport	77	89
Destruction Bay	64	82
Keno Hill	144	79
Flat Creek	1	71
Burwash Landing	69	67
Stewart Crossing	28	43
Quill Creek	2	35
Swift River	40	33
Mile 904, Alaska Highway	—	29
Mile 837, Alaska Highway	—	24
Mile 5, Klondike Highway	—	21
Mile 1035, Alaska Highway	—	20
Iron Creek	28	19
Tuchitua Lake	—	17
Mile 850, Alaska Highway	—	17
Windid Lake	—	16
Millerville	18	16
Mile 1169, Alaska Highway	8	15
Mile 687, Alaska Highway	6	14
Mile 866, Alaska Highway	6	14
Mile 2, Klondike Highway	—	13
Mile 974, Alaska Highway	—	13
Dominion Creek	5	12
Eagle River	—	12
Mccabe Creek	—	12
Mile 3, Klondike Highway	—	12
Mile 1019, Alaska Highway	21	12
Donjek	13	11
Cowley	11	11
Other	4,870	1,128
	<u>14,382</u>	<u>18,388</u>

*Boundary Change Since 1966

Source: Census Division, Statistics Canada

Table 9D-2

Population — Settlements in Northwest Territories

PRELIMINARY COUNTS of the 1971 CENSUS
with corresponding 1966 population figures.

	1966	1971		1966	1971
Yellowknife*	3,741	6,122*	Colville Lake	67	65
Inuvik	2,040	2,672	Daly Bay	59	—
Hay River	2,002	2,420	Enterprise	25	56
Fort Smith	2,120	2,372	Trout Lake	30	48
Frobisher Bay	1,631	2,014	Jean Marie River	51	47
Pine Point	459	1,225	Kakisa Lake	39	42
Rae	779	1,056	Keepooshaw	38	33
Baker Lake	596	756	Marian Lake Village	43	29
Fort Simpson	712	747	Camsell	—	25
Cambridge Bay	511	716	Edzo	—	25
Pangnirtung	376	690	Dory Point	—	17
Fort McPherson	654	679	Marian Lake Camp	—	16
Aklavik	611	677	Camp Kyukjuak	—	15
Coppermine	536	637	Pattinson Harbour	13	—
Fort Resolution	677	623	Cape Perry	50	12
Eskimo Point	464	598	Eureka	13	10
Cape Dorset	357	597	Paradise Gardens	—	10
Tuktoyaktuk	512	596	Snare Lake	56	9
Fort Providence	378	587	Aston Bay	—	8
Rankin Inlet	429	566	Resolution Island	18	8
Igloolik	328	563	Mould Bay	56	6
Pond Inlet	178	416	Hislop Lake	25	4
Coral Harbour	298	355	Rocher River	38	4
Fort Franklin	311	339	Twin Gorges	—	5
Broughton Island	201	334	Buffalo River Junction	—	3
Fort Good Hope	335	327	Nicholson Point	22	3
Norman Wells	199	301	Salt River	7	2
Gjoa Haven	162	276	Isachsen	12	2
Clyde	99	274	Bell Rock	—	1
Arctic Bay	123	269	Other	2,815	530
Hall Beach	100	263		<u>28,738</u>	<u>34,807</u>
Fort Liard	177	263			
Chesterfield Inlet	199	258			
Fort Norman	216	248			
Repulse Bay	146	242			
Holman Island	179	241			
Belcher Island	178	234			
Snowdrift	178	221			
Pelly Bay	171	215			
Whale Cove	181	213			
Spence Bay	247	209			
Lake Harbour	97	189			
Resolute Bay	254	184			
Lac La Marte	125	161			
Wrigley	136	152			
Sachs Harbour	132	143			
Tungsten	198	130			
Grise Fjord	98	109			
Arctic Red River	86	108			
Port Burwell	105	107			
Port Radium	1	99			
Paulalak	40	95			
Reindeer Station	76	—			
Rae Lake	53	73			
Nahanni Butte	71	66			

*Boundary Change Since 1966

Source: Mr. J. J. Lefebvre, Chief Geography Section,
Census Division — Statistics Canada

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Geography and Climate "E"

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Revised January, 1974

Geography and Climate

9E-1.1 General

The Yukon and Northwest Territories comprise about one-third of the total area of Canada, covering 207,076 square miles in the Yukon and 1,253,438 square miles in the Northwest Territories. Consequently, there is considerable variation in climate and geography within the two regions.

Climate is a cost factor in any planned activity in the Territories, but in many activities, such as mining, it is not a physical barrier. Mines have been operating successfully on a year-round basis at such points as Yellowknife and Port Radium for many years. Construction is carried on very successfully, by men and machines, during all seasons of the year.

There are four unique characteristics of the climate and geography North of 60 which are not found functioning together in the more southerly regions — extended periods of daylight or darkness, a ground condition known as “permafrost”, extended temperature range and the topographical region of the “barrens” and Arctic Archipelago.

The Arctic Circle marks the southern limit of the area where the sun does not set for one or more days during the summer and does not rise for one or more days during winter. The time of continual daylight north of the Arctic Circle is known as the period of the “midnight sun”.

The word “permafrost” is used to describe that part of the earth’s crust that is less than 32 degrees Fahrenheit (0 degrees Centigrade) in temperature.

The extended temperature range simply means the extremes in temperature that occur in the North as the seasons change. Because of extremes in wind and temperature and the low level of precipitation in the far north, tree life becomes non-existent. The irregular line marking the northern limit of tree growth is known as the “tree line”. It runs roughly on a diagonal from the mouth of the Mackenzie River on the Beaufort Sea, southeast to Hudson Bay, at approximately 60°N. North of this tree line are the “barrens” — low-lying land with innumerable lakes, swamps and muskeg. Beyond the barrens is the Arctic Archipelago a desolate region of mountains, barren islands and glaciers. (See Map 9E-1)

9E-1.1.1 Yukon Territory

The Yukon is a rugged land of plateaus and mountain ranges, cut off from the Pacific by the Coast and St. Elias Ranges which provide a barrier to the maritime influences from the Pacific. On the east, the Mackenzie Mountains, with ridges of about 8,000 feet, provide a physical barrier separating the Yukon from the Northwest Territories. This barrier also provides a lesser defence from the winter cold waves of the Arctic.

The mountains of the Yukon form the northern part of the Cordilleran Region of North America. Mount Logan in the western Yukon, at 19,850 feet, is Canada’s highest mountain and the second highest in North America. East of the Mackenzie Mountains lies the Interior Plain, a rough, irregularly rolling upland, with an average elevation of 4,000

feet. Mountain ranges within the interior plateau rise as high as 7,000 feet.

Cutting through both the mountain systems and the plateau are numerous river valleys, some with flat bottoms and sloping sides, while others have deep, narrow gorges with sides rising sharply. The rivers of the Yukon Territory rise in the northern limits of the Cordilleran mountain region and flow westward to the Pacific as part of the Pacific Drainage Basin. The Pelly, Stewart and Yukon Rivers are the major elements of this drainage system.

Climate

In climatological terms, “arctic” is defined as the area where the mean daily temperature of the warmest month of the year does not exceed 50 degrees F. In general the line marking the southern limit of this area follows the same pattern as the “tree line”. The regions of the Yukon and Northwest Territories below this “tree line” are “sub-arctic”.

Except for the extreme northern tip, the Yukon Territory is sub-arctic. Wide variations in temperature from month to month and year to year are characteristic of the Territory. The coldest winter months have averaged from —40 to —50 degrees F, while other winter months have an average temperature above 0 degrees F.

The geographic location of the Yukon is mainly responsible for these marked variations in weather. The Territory extends from the relatively warm Pacific to the cold Arctic Ocean. When cold air masses from the Arctic Ocean stagnate over the Yukon, temperatures drop rapidly and remain very low. Fortunately, periods of intense cold are usually of short duration. If the Arctic cold air masses move on eastward, warm air from the north Pacific Ocean fills in behind and winter temperatures may be relatively mild. January mean temperatures:

- + 5°F at Whitehorse
- 2°F at Testlin
- 7°F at Watson Lake
- 16°F at Dawson.

The settlement of Snag holds the record minimum for North America at —81 degrees F. Other minimum temperature records are —62 degrees F. at Whitehorse, —63 degrees F. at Testlin and —74 degrees at Watson Lake. In winter, the days are generally short with no effective sunshine.

Summer temperatures also vary according to the predominant air mass movements. Days can be quite hot when air from the Pacific Ocean or Alaska lies over the Yukon; when the Arctic air invades the Territory cold temperatures prevail. The summers, though short, are pleasantly warm with mean temperatures above 50 degrees F. during the months of June, July and August.

The highest temperature on record in the Yukon is 95 degrees F. at Dawson and Mayo.

The frost free season is short, ranging from 21 days at Pine Creek to 85 days at Watson Lake. On an average, the last spring frost occurs in mid-June and the first autumn frost in mid-August.

Although the summer season is short the length of days helps to offset such a limited growing period.



Map 9E-1

Dawson City has almost 24 hours of daylight during late June and 20 hours during July. Farther south Whitehorse has about 20 hours of daylight in June and 18 hours in July.

Mean annual precipitation is remarkably uniform over most of the Yukon Territory ranging from 9 to 17 inches at the valley stations. This relatively low amount is due mainly to the high barrier presented by the St. Elias Mountains which cut off moist air from the Pacific. There is no pronounced wet or dry season although at most weather stations, July and August are the rainiest months and the spring has the least precipitation.

Winter snowfall averages from 40 inches to more than 80 inches with the heaviest falls in the Laird Valley in the St. Elias Mountains and on the westward slopes of the Mackenzie Mountains. Snow usually lies in the valleys from about mid-October to early April. The snow and ice fields of the St. Elias Mountains provide an important source of water for the rivers in the southwestern part of the Territory.

9E-1.1.2 Northwest Territories

The Northwest Territories are immense, a land of great contrasts, of mountains and plains, innumerable lakes and semi-deserts, vast expanses of spongy muskeg and stark outcropping of ancient rock.

The mainland of the Northwest Territories consists of two major geological regions, the Precambrian or Canadian Shield and the Interior Plains. The mountainous Cordilleran region forms the great divide between the Yukon and the Northwest Territories.

The Precambrian Shield, consisting of 700,000 square miles of bedrock, mostly granite, extends from Great Slave Lake in the west to Baffin Island in the east. Except for the rugged mountains of the eastern islands, the Shield rarely rises more than a few hundred feet. Nevertheless, it presents a rugged barren landscape characterized by rolling hills and valleys. In places, the valleys are water-filled which results in striking, finger-like lakes. Then western edge of the Shield is marked by Great Bear and Great Slave Lakes, the largest lakes in Canada.

The Interior Plains lie between the Shield and the Cordilleran region of the western mountains. The plains are a continuation of the Great Plains that stretch from the Gulf of Mexico northward. Within the Territories the plains are dominated by the Mackenzie River.

The variety and contrast of the Arctic Islands is great and often starkly picturesque. In the east, the ancient Precambrian rocks form a spine of mountains from Baffin to Ellesmere Island which rise to heights of 10,000 feet with spectacular vertical cliffs and deep fjords along their eastern coasts. Glaciers are found in the higher altitudes. To the west, are the Arctic lowlands, consisting of recent limestones, sandstones, shale and gravel. North and northwest of these lowlands lies the Sverdrup Basin, an area of higher relief formed by drastic alteration of the

sedimentary rocks. At the extreme northwest and fronting the polar basin, is a thin shelf of sedimentary rocks that makes up the Arctic Coastal Plain.

The lands of the Territories, particularly the Arctic, were greatly altered by glaciation. As the glaciers retreated the area was relieved of its tremendous burden of ice and has been rising slowly ever since. The advancing and retreating glaciers sculptured and shaped the face of the area. In regions of the Shield they scraped, smoothed and exposed bare bedrock. In places they formed series of low, elongated parallel hills called moraines. In other areas the granite or sedimentary bedrock was covered with boulders, sand and silt. The streams of water produced from the melting glaciers washed out and deposited sand in the form of long, low hills or eskers that resemble serpentine railway embankments running for miles across the country.

Geologically the Arctic regions have just emerged from the last glacial period and in a sense are still in the grip of a "little ice age". The ice fields and glaciers of the eastern Arctic cover 60,000 square miles. In addition the Arctic seas and straits are ice filled for a large part of the year.

The major river systems of the Territories are closely related to the physical regions. In the Precambrian Shield area the main rivers are the Thelon, Kazan, Dubawnt and Back. With the exception of the Thelon, these rivers have falls, cataracts and innumerable shallow rapids which impede navigation. In the Interior Plains, the great, central river is the Mackenzie. In contrast to the rivers of the Shield this river is navigable for the whole of its 1400 mile length. It reaches the sea through an extensive maze of channels which wind through a delta spreading over several hundred square miles.

Climate

Approximately half the mainland area of the Northwest Territories and all of the Arctic Islands lie in the Arctic.

For more than half of the year these regions experience severe and persistent cold. The freezing season starts in September over the high Arctic, advances southward, following progressively colder air outbreaks and reaches the southern limits of the sub-Arctic in late October. The turbulent flow of cold air, as it spreads across the relatively warmer open seas and channels, produces the stormiest period of the year and accounts for most of the winter's snowfall. By December, with most of the moisture sources sealed off by ice, the cold atmosphere contains so little moisture that the few disturbances produce only thin cloud layers, and consequently, snowfall is very light. Average annual snowfall in the Arctic region is less than 30 inches.

Temperatures seldom rise above the freezing point from December to February in the sub-Arctic, and from November to April in the Arctic. Blowing snow and the chilling effect of strong winds present major hazards to winter travel throughout the treeless Arctic, although the frequency and severity of blizzard conditions vary widely over the region. The region most frequented by blizzards is the

barren lands west of Hudson Bay, where strong winds are common. January is normally the coldest month.

In the Mackenzie Basin mean monthly temperatures are below 30 degrees Fahrenheit for seven months, April to October, although winter minimum temperatures may fall below -70 degrees F. and summer maximum rise above 95 degrees F.

On the barrens mean temperatures are below freezing for eight or nine months of the year.

In the Arctic Islands the mean annual temperatures are lower than in any other part of Canada, -15 degrees F. and 10 degrees F. in the very far north on Melville and Ellesmere Islands.

In the winter most water surfaces are frozen but the new ice is usually less than six feet thick. The highest mean January temperatures occur in the Hudson Strait area with values ranging from 0 degrees F. to -5 degrees F. at the eastern entrance and -10 degrees F. to -15 degrees F. at the western end. The lowest January mean of -30 degrees F. to -35 degrees F. occurs north of 75° latitude which cuts through the lower part of Melville Island.

February marks the start of a return to warmer weather in the Northwest Territories. However, temperatures above freezing are not reached until May in the sub-Arctic, and June in the Arctic. In the Mackenzie Valley the snows disappear in May, but not until June in the Arctic. Summer is short but pleasantly sunny and warm in the sub-Arctic. In the Mackenzie Valley there are three summer months with temperatures over 50 degrees F. The warmest month in the valley is July with a mean of about 60 degrees F. in the upper portion of the region. The frost-free period in the Mackenzie Basin varies from 50 to 100 days.

On the barrens the mean daily maximum temperature during the summer months rises to 55 degrees F. or 60 degrees F. Extreme summer temperatures have exceeded 85 degrees F. occasionally. Spring comes very late, delayed by the slow melting of the ice and subsequently, by the cold water of the sea, lakes and muskeg. Freezing temperatures may occur during any month of the year, but on the average there is a frost-free period of 40 to more than 60 days throughout the region.

In the Arctic Archipelago temperature extremes are not as severe as in a continental area at the same latitude. During the cool, brief summer the ice-filled polar waters, with a surface temperature near 30 degrees F, prevent the air from warming to any extent. Consequently, summer temperatures are uniformly cool throughout the entire region, averaging 40 degrees F. to 45 degrees F. during July, the warmest month.

Precipitation in the Territories is light. In the Mackenzie Basin the annual total range is from 9 to 15 inches. Annual snowfall in the sub-Arctic area is about 50 inches. On the barrens precipitation decreases from 12 inches in the south to seven or eight inches in the north, with snowfall contributing about 40 to 50% of the total moisture. Snowfall in the Arctic region is less than 30 inches annually. The greatest amount of precipitation in the barrens

falls in the summer and early autumn. Snow covers the ground for almost eight months of the year, with the greatest monthly snowfall in October and November. Strong winds are frequent in this area in winter, especially the District of Keewatin.

The Arctic Archipelago is one of the driest regions in the world. The annual total precipitation over the islands north of the Parry group averages less than 5 inches, with Eureka having an average of only 2.5 inches and Mould Bay only 3 inches a year.

Southward from the Parry Islands there is an increase of annual precipitation. In southern Baffin Island the mean annual totals range from 10 to 15 inches. Snow may fall during any month of the year but rain is limited to the relatively short, summer warm period. In the south 40 to 50% of the annual total precipitation occurs as rain and in the very far north this is decreased to about 30%. Although showers and even a rare thunderstorm may occur occasionally in the southern part of the Archipelago, most annual rainfall is in the form of a light drizzle. Although snowfall is light in the Arctic, a distinct monthly maximum is observed in the autumn and also a spring maximum which is not as marked in the southern half of the Archipelago as in the north. The tiny snow crystals are readily blown about by the wind, and as a result most of the ground is bare all winter, while deep drifts are formed in ravines, hollows and in the lee of obstacles.

9E-2.1 Permafrost

Perennially frozen ground or permafrost, is probably the best known and yet least understood feature of the North. Although not a new phenomenon, it is only the relatively recent building of resource development projects that has made the special problems of construction in permafrost so evident to engineers.

"Permafrost" is that part of the earth's crust where the temperature is below 32 degrees F. The term describes only the thermal condition of the ground and not its composition which may be bedrock, gravel, sand, silt, clay or muskeg, singly or in combination.

In the case of solid rock, gravel and sand, the frozen condition does not seriously affect the engineering properties of material. If, however, the ground consists of water-bearing silt or clay, freezing transforms the material to a hard and solid mass. It is to such perennially frozen silt and clay that the name permafrost is popularly applied.

The ground in permafrost areas is normally thought of as two distinct layers: the upper, or active layer, which alternately freezes and thaws with the seasons; and the lower, or permafrost layer, which remains frozen continuously. The depth of the active layer varies with many local factors including soil type, moisture content and vegetative cover in much the same way as depth of frost penetration varies with local conditions in the more southerly areas of Canada. Similarly, foundations located in the active zone are exposed to frost action problems analogous to those encountered in the freezing zone of the soil

in more temperate regions. Almost one-half of the land area of Canada is underlain by permafrost. Although chiefly confined to the Northwest Territories and Yukon Territory, it does extend into the upper portions of the provinces, particularly into the northern parts of Manitoba and Quebec. As would be expected, the thickness of permafrost increases toward the north, ranging from a few feet in areas such as Hay River to approximately 1300 feet at Resolute Bay in the Arctic Islands.

The southern limit of permafrost is not a well-defined line, it consists of a belt of land several hundred miles wide in which areas of continuous permafrost give way to areas of sporadic permafrost, where the frozen ground tends to exist only as scattered patches or islands within the unfrozen material.

It is these latter areas that often pose the most difficult construction problems for the engineer, due mainly to the limited extent of permafrost and consequent difficulty of predicting its occurrence at a specific location, and to its temperature which is generally near 32 degrees F. and thus close to melting.

It is the melting of permafrost containing large quantities of ice that gives rise to the major construction problems in permafrost areas. The ice in frozen soil can take the form of layers or lenses ranging from hairline size to 4 feet in thickness, or can occur as coatings over small soil particles, stones and boulders. Some of the most spectacular ice deposits are found as chunks or wedges buried in the frozen ground.

For soils in a frozen condition, the ice acts like a cement, bonding the individual particles together and producing a soil with considerable strength. When thawed, however, the hard-frozen soil can change to a soft slurry with little or no supporting power.

Knowledge of the ice content of frozen soil is of major importance to the engineer since it provides a measure of the extent to which settlements will occur or trafficability will be affected by thawing. Materials such as frozen rock, gravel, or coarse sand frequently contain little ice and thus impose few problems. Much of the Territories, however, is underlain by fine-grained soils resulting from glacial action. Such soils generally have high ice contents up to six times that of the soil by volume and if these are to provide suitable support for engineering structures, they must not be allowed to thaw. This is difficult to achieve in view of the extreme sensitivity of permafrost to temperature differences.

In undisturbed areas of permafrost, a delicate condition of temperature equilibrium exists between the top of the permafrost and the ground surface. Any changes in the natural insulating cover such as the stripping of moss can upset this thermal balance of nature and start the permafrost thawing. Even one passage of a tracked vehicle over the natural ground surface will reduce the insulating value of the moss cover sufficiently to cause thawing.

Preservation of the frozen condition during construction and operation of a building or other

engineering facility requires not only specific design and construction techniques but also strict discipline and control of all construction operations. In many cases, it is necessary to protect the organic cover prior to beginning work in an area by placing a one-to-two foot gravel layer over all areas that might be disturbed.

Another property of permafrost is its imperviousness to the flow of water. Water cannot percolate through the perennially frozen ground, so all water movement tends to occur over or just below the ground surface. This lack of sub-surface drainage often results in an excess of surface water even though much of the Territories is characterized by very low precipitation. If natural drainage is impeded by construction, the accumulated water will accelerate the thawing of the permafrost, with possible serious results.

Since the problems of construction are greatly lessened in rock or granular soils with little ice content, location of such areas is a most important element in northern construction.

Although the siting of engineering facilities on granular materials containing little or no ice permits the use of conventional design and construction techniques, this is not always possible. Where fine-grained materials with high ice contents must be utilized, every effort should be made to preserve the frozen condition of the ground.

The way in which this is achieved in practice will depend on the type of engineering structure. For heated buildings and most enclosures, the ventilation method is commonly used. With this method, the structure is raised above the ground to permit circulation of air beneath, thus minimizing heat flow to the permafrost. The foundations are usually embedded in the perennially frozen ground so that some lowering of the permafrost table can be tolerated without loss of support. Steamed-in piles have proved particularly well suited to this method in fine-graded soils. Where stones and boulders in the soil make pile placing difficult, however, alternative foundation designs may prove more economical.

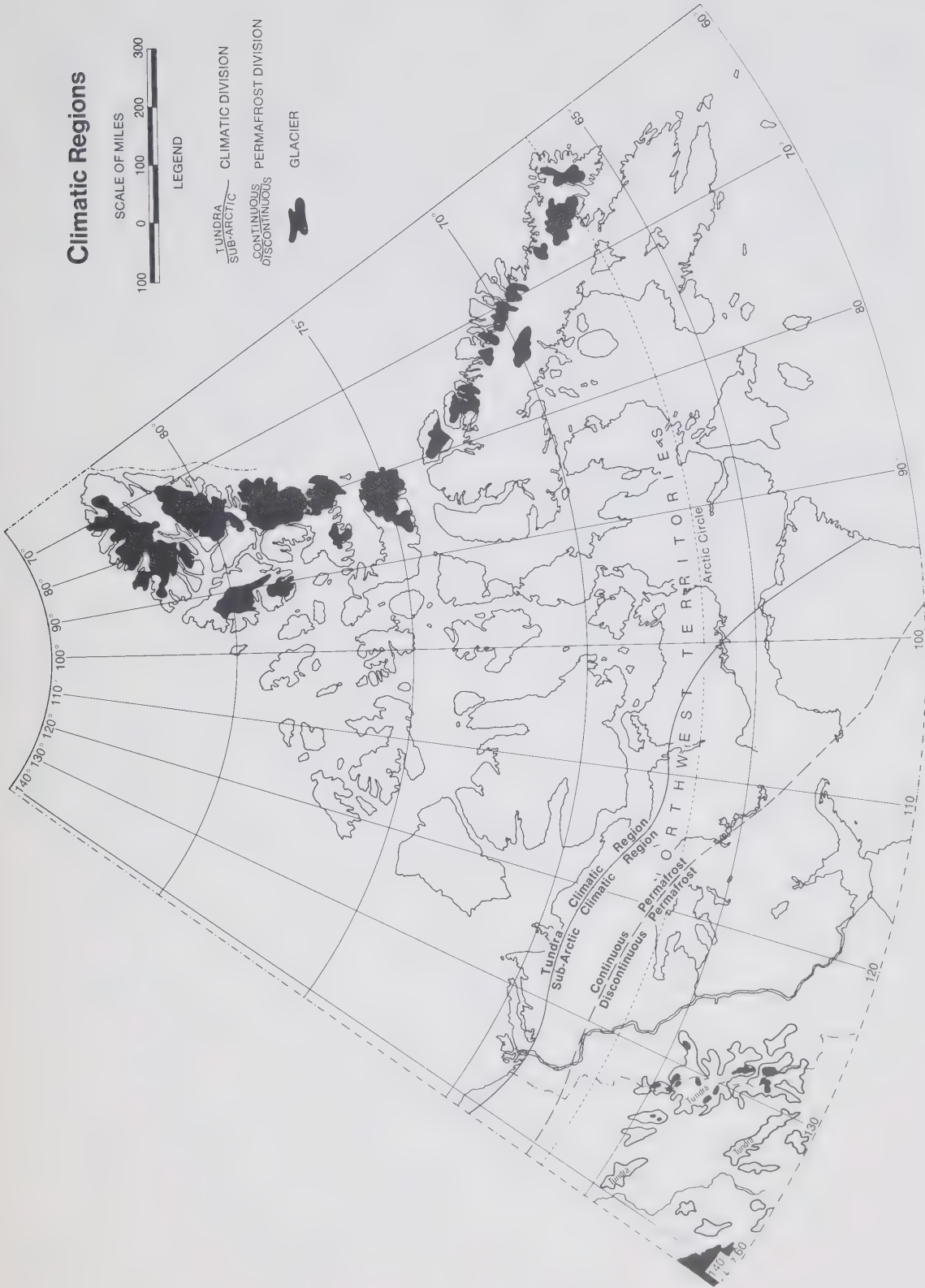
Occasionally, surface foundations are used. In such cases, an insulating blanket of gravel is first placed on the undisturbed ground to retard downward heat flow from the building constructed over it. This method must be used with caution since the thickness of gravel required to preserve the permafrost will vary with many local factors and is difficult to predict. Within this type of construction, even slight lowering of the permafrost table may cause settlement depending on the soil properties, and in addition, the problem of frost action in the active layer of soil beneath building may prove serious.

These considerations become particularly critical in road and airstrip construction where the ventilation method, as used with buildings, cannot be applied and an insulating gravel blanket must be relied on to retain the thermal regime. In such cases, the importance of selecting the most favorable site and of keeping disturbance of the surface cover to an absolute minimum in poor soil conditions takes

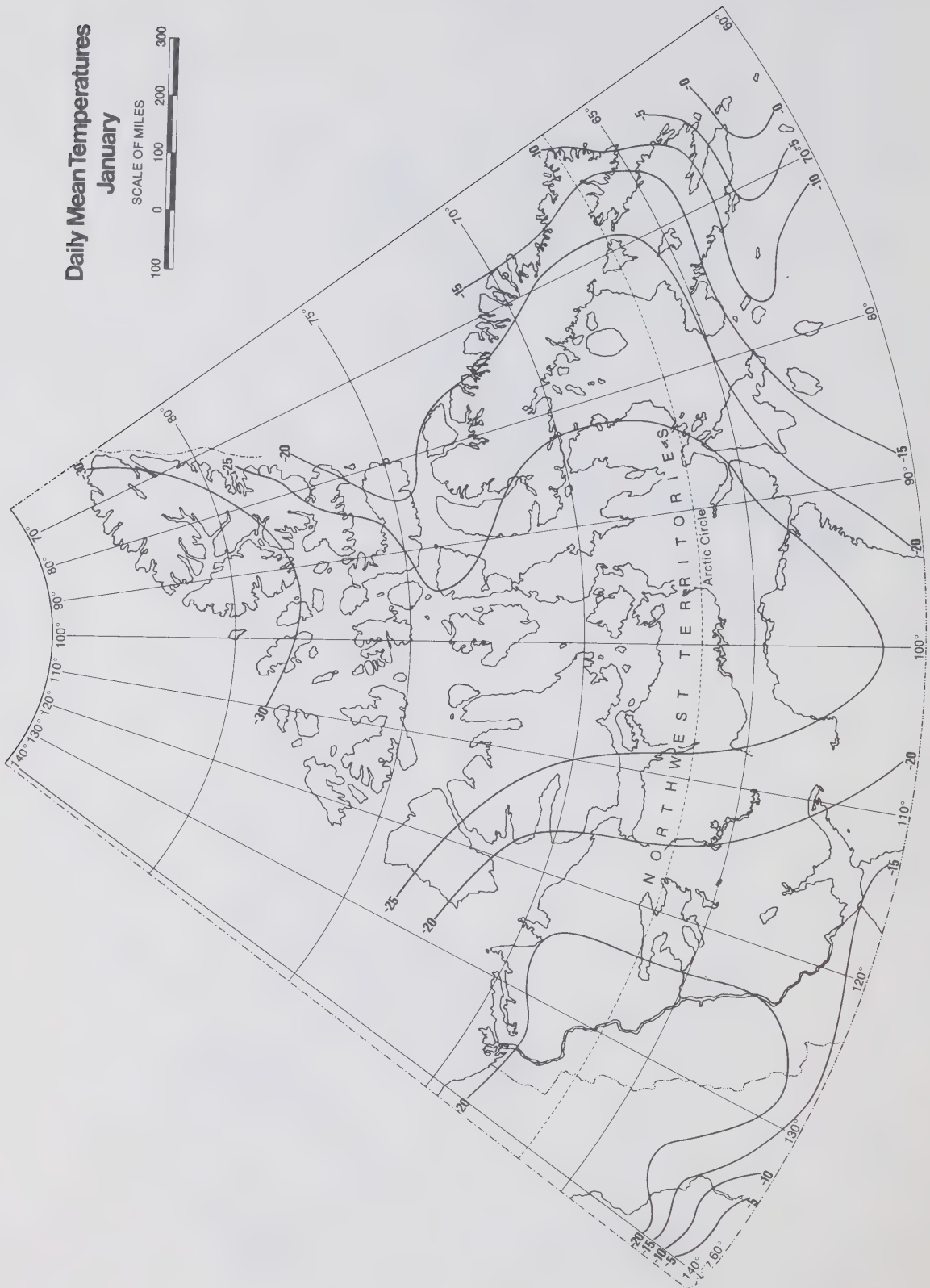
on even greater significance. The only exception to this principle of preserving the frozen ground exists in patches and is close to melting. In these areas it may be economical to remove the permafrost by thawing prior to construction and then to build in the normal way.

Normal excavation techniques are much less effective in permafrost. Where gravel fill is required, particularly the large amounts needed for roads and airstrips, borrow pits should be located, stripped of vegetation, and allowed to thaw by natural means, well in advance of construction.

Permafrost imposes difficulties with water and sewage facilities by complicating the location of sub-surface water supplies and seriously limiting the use of the usual methods of sewage disposal into the soil. In addition to the foundation stability problem resulting from thawing of permafrost, water and sewer lines cannot be placed below frost level and are therefore subject to freezing hazards. To overcome such difficulties, the utility lines are often placed in heated and insulated boxes, called utilidors, located above grade and supported in a manner similar to buildings. (See Maps 9E 2 to 9E 4)



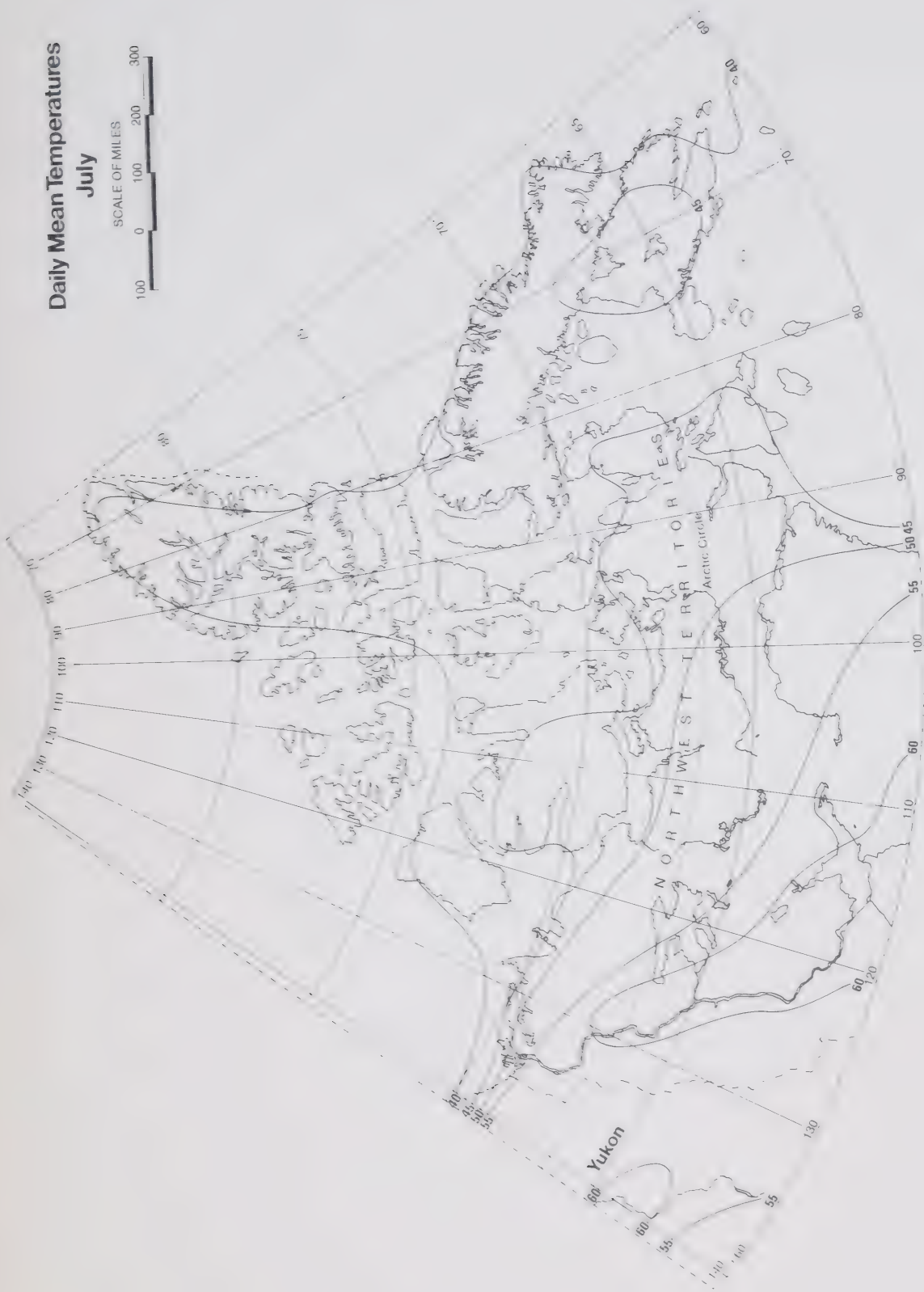
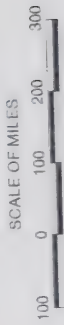
Map 9E-2



Map 9E-3

Daily Mean Temperatures

July



Map 9E-4



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Revised January, 1974

Communications

9F-1.1 General

The launching of Anik, Canada's first domestic communications satellite in November, 1972, began a new era in communications North of 60. It introduced a new service of high quality television, radio and telephone communication as well as telex, facsimile transmission and computer links to the Yukon and the Northwest Territories. The first satellite was to be followed in a few months time by Anik II a back-up satellite.

Anik is operated by Telesat Canada, a corporation jointly owned by the Canadian telecommunications carriers and the Federal Government. Eventually, shares will be offered to the public and this will result in one third ownership by the Canadian carriers, the general public and the Federal Government.

Anik has 12 wide-band channels and the planned use is as follows:

3 channels for use by the Canadian Broadcasting Corporation

2 channels for use by Trans-Canada Telephone System CN/CP

1 channel for use by Canadian Overseas Telecommunications Corporation

2 channels for use by Bell Canada for the north

2 channels as yet not designated

2 channels in reserve

The satellite in 1973 brought high quality telephone service to the eastern Arctic communities of Frobisher, Resolute, Igloolik and Pangnirtung. Satellite television service, beamed from southern Canada, arrived in 1973 in the Yukon communities of Whitehorse, Clinton Creek, Dawson, Elsa, Faro and Watson Lake, and the Northwest Territories communities of Inuvik, Yellowknife, Pine Point, Fort Smith and Rankin Inlet.

CBC radio network service through low power relay transmitters (LPRT) is provided to the settlements of Beaver Creek, Carmacks, Clinton Creek, Dawson, Destruction Bay, Elsa, Faro, Haines Junction, Mayo, Swift River, Teslin and Watson Lake.

Northwest Territories communities receiving CBC network radio service are Fort Good Hope, Fort Norman, Fort Resolution, Fort Simpson, Fort Smith, Fort Providence, Hay River, Norman Wells, Pine Point, Rae/Edzo and Wrigley.

The Northern Service of the CBC has five program centres in the North: Yellowknife, Inuvik, Frobisher Bay, N.W.T.; Whitehorse, Y.T.; and Churchill Man.

The remaining LPRT stations in the Territories are normally unattended. These are grouped into two regional networks having program centres at Whitehorse for the Yukon and Yellowknife for the Mackenzie Valley-Great Slave area. These regional networks are in turn connected to the national English radio network. At each LPRT point a community newscaster reports on local news to the regional network centre for broadcast over the regional network. In addition, most LPRT com-

munities also have a sports correspondent who reports to the regional centre.

In addition to the CBC service, a number of communities are serviced by community radio stations. These include CHPI Pond Inlet; CFCT Tuktoyaktuk; CFMR Fort Simpson; Northwest Lands and Forest Service and the Yukon Lands and Forest Service; CKQN Baker Lake and CBQR Rankin Inlet.

Commercial radio and television stations are located at Whitehorse and Yellowknife.

In addition, in 1973 the Federal Government launched a Northern Pilot Project designed to test experimental communication systems which could be used to meet the needs of people who live in small isolated settlements. The Federal Government chose Baker Lake, N.W.T. as the site to launch the project. It involves the use of high frequency two-way radio, small FM radio broadcasting systems, and portable video-tape equipment.

The project is under the direction of the Department of Communications and resource material is being provided by the Canadian Broadcasting Corporation and the National Film Board.

Similar systems are to be installed at Chesterfield Inlet, Eskimo Point, and Rankin Inlet.

In the Yukon Territory most communications facilities are operated by Canadian National Telecommunications. Telecommunications are by land line from Whitehorse to the principal communities of the Yukon. In addition there are land links to the Alaskan Panhandle communities of Skagway and Haines where connections tie-in to the troposphere-scatter system operated along the Alaskan coast.

In the Northwest Territories, commercial telecommunications are provided by Canadian National Telecommunications in the western regions, and by Bell Canada in the eastern regions.

In addition to commercial facilities, several government and private radio networks are in operation North of 60, which provide message services for local residents.

The Federal Ministry of Transport operates a radio and telegraph network for its aeronautical and meteorological services, for air and marine traffic, and for the transmission of meteorological data.

The Department of Indian Affairs and Northern Development operates radio networks through the Northwest Lands and Forest Service and the Yukon Lands and Forest Service. The Territorial Governments operate services for administrative purposes and game protection. Other networks are operated by the Royal Canadian Mounted Police, the Hudson's Bay Company and various religious missions throughout the Territories.

9F-2.1 Yukon Territory

9F-2.1.1 Micro-Relay/Troposphere-Scatter System
The Canadian National Telecommunications/Canadian Pacific Telecommunications network connects the Yukon Territory with southern Canada via Edmonton, Alberta.

A micro-relay system operated by CNT between Grande Prairie, Alberta and Fairbanks, Alaska via

Mount Dave in the Yukon, originally built for military purposes, is also used for all non-military traffic to the Yukon and Alaska. The system is designed to provide television transmission facilities with the installation of a TV channel.

A high-quality micro-relay and troposphere-scatter system from Victoria, B.C. to Haines, Alaska, provides an alternate route to the Grand Prairie-Fairbanks system.

9F-2.1.2 Land Lines

Canadian National Telecommunications offers telephone and telegraph land line service to Whitehorse, Mayo, Dawson, Elso and Keno, and other smaller communities.

9F-2.1.3 Mail

Regular mail services are available in the Yukon. The frequency of service depends on the size, importance and location of the settlement. Most mail is delivered by air, although in southern areas, both air and truck services are used.

9F-3.1 Northwest Territories

9F-3.1.1 Micro-Relay/Troposphere-Scatter Systems
Canadian National Telecommunications/Canadian Pacific Telecommunications network serves the Northwest Territories, via Edmonton, Alta.

CNT/Alberta Government Telephones operate a high-quality micro-relay between Edmonton, Alta. and Hay River, N.W.T., to provide a direct link between the Territories and southern Canada.

A combination micro-relay and troposphere-scatter system between Sept Isles, Que., Goose Bay, Labrador and Frobisher handles all traffic to and from Baffin Island and the eastern regions of the Northwest Territories.

The Sept Isles-Goose Bay segment is owned and operated by Bell Canada and Quebec Telephone. The troposphere-scatter system owned and operated by the United States Air Force connects Goose Bay to Resolution Island from which there is a spur link to Frobisher. The Frobisher station is owned by the Department of Communications and operated by C.N. Telecommunications.

CNT/Saskatchewan Government Telephones operate a tropospheric-scatter system between Uranium City, Sask., and Fort Smith, N.W.T. Messages are routed via Hay River, N.W.T.

CNT operates a troposphere-scatter system between Hay River, N.W.T., and Lady Franklin Point, N.W.T. This system was originally built by the USAF for communication with distant early warning stations in the Far North. Telephone and telegraph messages originating in southern Canada are carried on a commercial basis to Lady Franklin Point, and then on leased DEW line facilities to Cambridge Bay, N.W.T.

9F-3.1.2 Land Lines

A CNT line provides voice and radio transmission between Hay River, N.W.T. and Inuvik, N.W.T., with connections to intermediate points along the Mackenzie River.

Connected to this system are service extensions to Fort McPherson, Tuktoyaktuk, Aklavik and Reindeer Depot.

A high-quality land line, built and operated by CNT, runs between Fort Smith, N.W.T. and Yellowknife, N.W.T. Settlements along the north and south shores of Great Slave Lake, and Uranium City, Sask., are connected to the system.

All communications to the Keewatin District are channelled along the CNT line from The Pas, Man., to Churchill, Man. where connections to Keewatin settlements are made by means of various high frequency radio systems, such as those operated by Bell Canada and the Ministry of Transport.

9F-3.1.3 Mail

Regular mail services are available at most settlements in the Northwest Territories. The frequency of service depends on the size, importance and location of the settlement. Most mail is delivered by air.

9F-4.1 Additional Information Sources

More detailed information on communications services North of 60 may be obtained by writing: Northern Policy and Program Planning Branch, Department of Indian Affairs and Northern Development, 400 Laurier Avenue, Ottawa, Ontario K1A 0H4

Department of Communications,
100 Metcalfe Street,
Ottawa, Ontario
K1A 0C8

Canadian National Telecommunications,
600 Peel Street,
Montreal, P.Q.

Canadian National Telecommunications,
CN Tower,
104th. Ave. and 100th. St.,
Edmonton, Alberta

Hudson's Bay Company,
Winnipeg, Manitoba

Anglican Church of Canada,
600 Jarvis Street,
Toronto, Ontario

Bell Canada,
1150 Chemin St. Louis,
Sillery, P.Q.

Northern Service,
Canadian Broadcasting Corporation,
Montreal, P.Q.

Table 9F-1

Typical Telephone Rates North of 60 (in Dollars)

Route	Day		Night	
	First 3 min.	Each add. min.	First 3 min.	Each add. min.
Edmonton- Yellowknife	3.75 p-p*	0.80	2.80	0.60
	2.50 s-s**	0.80	1.85	0.60
Edmonton- Inuvik	4.65	1.00	3.50	0.75
	3.10	1.00	2.30	0.75
Edmonton- Whitehorse	4.25	0.95	3.20	0.70
	2.85	0.95	2.15	0.70
Edmonton- Dawson	4.55	1.00	3.40	0.75
	3.05	1.00	2.30	0.75
Yellowknife- Whitehorse	3.90	0.85	2.90	0.65
	2.60	0.85	1.95	0.65
Montreal- Whitehorse	5.45	1.20	4.10	0.90
	3.65	1.20	2.75	0.90

*p-p Person to Person

**s-s Station to Station

In off-peak hours discount rates are allowed on
customer dial calls as follows:

Monday through Saturday evenings 6 - 11 p.m. $\frac{1}{3}$ off

Monday through Saturday 11 p.m. — 8 a.m. $\frac{2}{3}$ off

Sundays 8 a.m. — 6 p.m. $\frac{3}{4}$ off

Sunday after 6 p.m. $\frac{1}{2}$ off.

Table 9F-3

Commercial Telephone Service North of 60

Legend

X	— in place — designated carrier
P	— Proposed agency
DL	— Via DEWline
IP	— Interchange Point
E	— Emergency Traffic only
B	— Private Stn. — May handle messages for others
MOT	— Ministry of Transport
CNT	— Canadian National Telecommunications
BELL	— Bell Canada
RCMP	— Royal Canadian Mounted Police
HBCO	— Hudson Bay Company
DIA	— Department of Indian Affairs and Northern Development
DNR	— Quebec — Department of Natural Resources
DNH	— Department of National Health and Welfare

Table 9F-2

Typical Telegraph Rates North of 60 (in Dollars)

	FULL RATE		NIGHT LETTER	
	15 Words	Each Add'l Word	50 Words	Each Add'l 25 Words
Edmonton — Yellowknife	2.15	0.10	1.85	0.25
Edmonton — Inuvik	2.15	0.10	1.85	0.25
Edmonton — Whitehorse	2.15	0.10	1.85	0.25
Edmonton — Dawson	2.15	0.10	1.85	0.25
Yellowknife — Whitehorse	2.15	0.10	1.85	0.25
Montreal — Frobisher	3.00	0.12	2.65	0.25
Toronto — Yellowknife	3.00	0.12	2.65	0.25
Toronto — Whitehorse	3.00	0.12	2.65	0.25
Montreal — Resolute (CNT Charges)	3.00	0.12	2.65	0.25
Plus Other Line Charges (MOT)	(1.95 1st 15 wds) (0.09 per wd, next 10) (0.06 per wd, over 25)		(1.95 1st 50 wds) (0.39 each 10 wds add'l)	
Toronto — Resolute (CNT Charges)	3.00	0.12	2.65	0.25
Plus Other Line Charges (MOT)	(1.95 1st 15 wds) (0.09 per wd, next 10) (0.06 per wd, over 25)		(1.95 1st 50 wds) (0.30 each 10 wds add'l)	

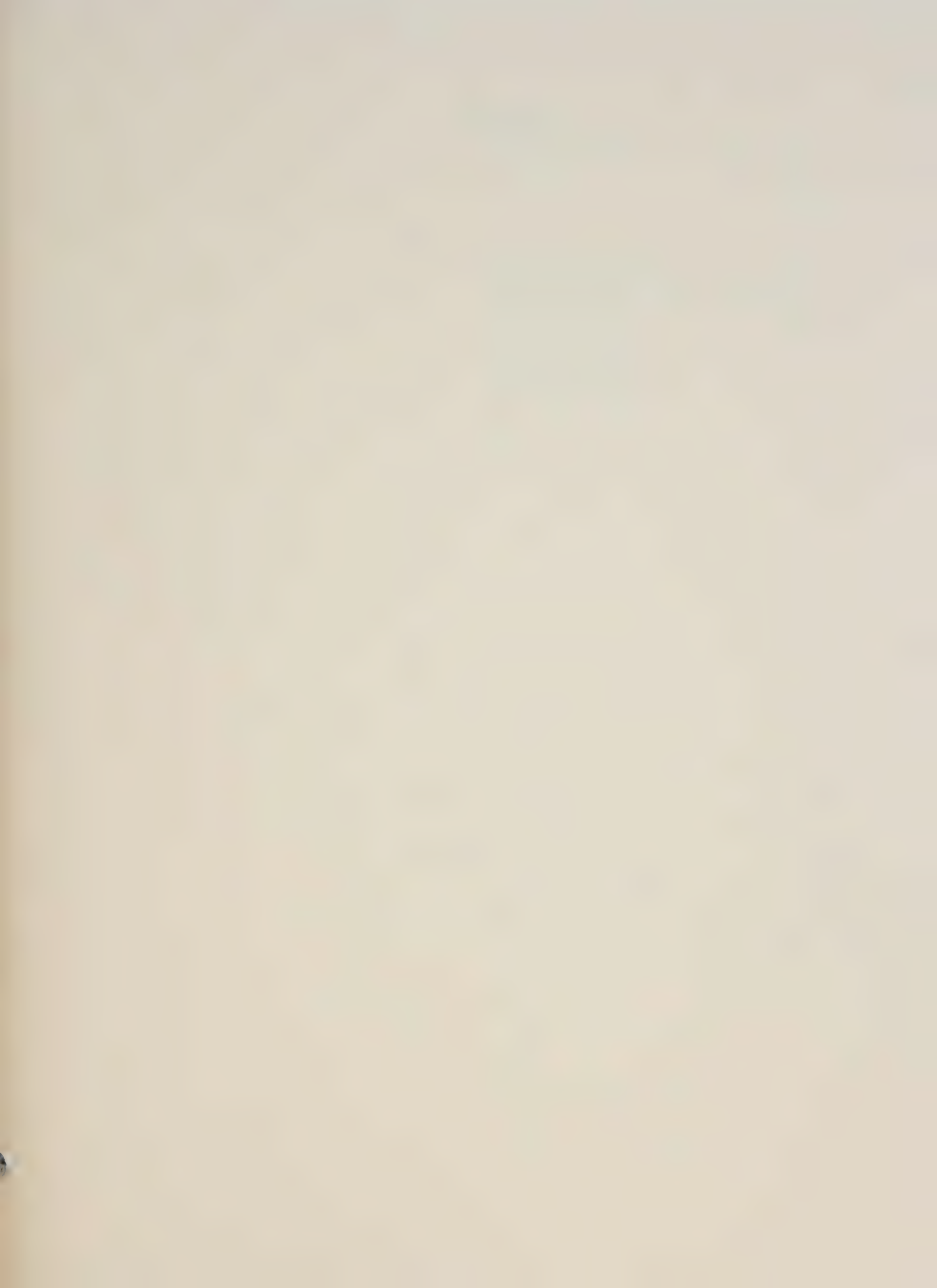
Table 9F-3

Name of Telecommunication Agencies

	MOT	CNT	BELL	RCMP	HBCO	DIA	DNH	DNR
Aishihik	—	X						
Aklavik	—	X		E				
Alert	X							
Alexandria Fiord	—		X					
Arctic Bay	—		X		E			
Arctic Red River		X		E	B			
Baker Lake			X					
Bathurst Inlet	—				B		B	
Belcher Islands (Sanikiluaq)	—		X					
Broughton Island			P		E			
Cape Christian (See Clyde River)								
Cape Dorset	—		X					
Cape Dyer (DYE)	—	DL	X					
				Private Toll Stn. operated by USAF through their base station at Goose Bay.				
Cape Hopes Advance	X							
Cape Parry (PIN)		DL			B			
Cambridge Bay (CAM)	X	X						
Carmacks	—	X		E				
Chesterfield Inlet			X					
Clyde River	X		X					
Contwoyto Lake (Pellett Lake)	—	X						
							(b) Opr. Pacific West Airways	
Coppermine	X	X		E				
Coral Harbour (airport) (See also Southampton Isl.)	X		X					
				This Exchange has Extended Area Service with Southampton Island (No Toll Charge)				
Cape St. Charles			X					
Canatiche			X					
Dawson, Y.T.	—	X		E				
Discovery	—	X						
Elsa	—	X		E				
Ennadai Lake	X				B			
Enterprise	—	X						
Eskimo Point			X					
Eureka	X							
Fort Franklin	—	P			B			
Fort Good Hope	—	X		E				
Fort Liard	—	X			B			
Fort McPherson	—	X		E				
Fort Norman	—	X		E				
Fort Providence	—	X						
Fort Rae (See Rae)								
Fort Reliance	X							
Fort Resolution	X	X						
Fort Simpson	— IP	X IP		E				
Fort Smith	X	X						
Fort Wrigley (See Wrigley)								
Franklin (See Fort Franklin)								
Frobisher	X	X	IP					
Fort George			X					X
Fox Harbour			B					

	MOT	CNT	BELL	RCMP	HBCO	DIA	DNH	DNR
Gjoa Haven	—	X						
Grise Fiord	—		X	E				
George's Cove			X					
Goose Bay			X					
Great Whale River								X
Hall Beach	—	DL						
Haines Jct.	—	X		E				
Hay River		IP		E				
		X						
Herschel Island	—							
Holman Island	—	X			B			
Igloodik	—		X					
Inuvik	IP	X		E				
	X							
Isachsen	X							
Ivugivik								X
King William Land					B			
Lady Franklin Point	—	X						
Lake Harbour	—		X		E			
Mayo	—	X		E				
Mould Bay	X							
Nahanni (NAIN)	—	X						
Nottingham Island	X		X					
Old Crow (Yukon)	X	X		E				
Pangnirtung	—		X		E			
Pelly Bay	—	P						
Perry River (Island)	—	X			B			
Pine Point	—	X						
Pond Inlet	—		X		E			
Port Radium	—	X						
Payne Bay								X
Povungnituk			X					X
Port Hope Simpson			X					
Rae	—	X						
Rankin Inlet			X					
Reindeer Depot (Station)	—	X						
Repulse Bay	—		X					
Resolute	B		X					
Resolution Island	X							
Ross River	—	X			B			
Sachs Harbour	X	X		E				
Snag	—	X						
Snare River	—	X						
Snowdrift	—	X			B			
Southampton Island			X					
Spence Bay	—	P			B			
Sugluk								X
Taltson River	—	X						
Teslin	—	X		E				
Tuktoyaktuk	—	P		E				
Wakeham Bay			X					X
Watson Lake	—	X		E				
Whale Cove	—		X					
Whitehorse	—	X		E				
Wrigley (Village)	—	X			B			
Wrigley Airport	—	X						
Yellowknife	X	X		E				

N.B. In various settlements, local operation of telephone communications is carried out by an interdepartmental system for federal use. The public can use this system for only 2 hours at a time.



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400 Laurier Ave., West
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North

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CORRIGENDUM

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